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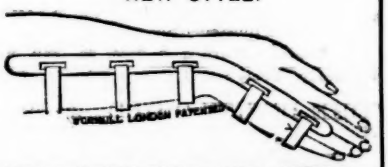

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SOME

Statistical Results

OF THE

TREATMENT OF CHEST WOUNDS.

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LIEUTENANT COLONEL, R.A.M.C.

THE figures analysed in the first part of this paper are based upon the after-histories in the United Kingdom of 170 cases of chest wound which, when seen by the writer at a base hospital in France during the first two years of the war, presented various points of clinical interest and were therefore made the object of later inquiry. The figures are incomplete, because they omit not only those that died at the base hospital, but also a large number of uneventful cases whose later history was not ascertained. They do not in any way represent the proportionate incidence of the various complications of a chest wound, but they are sufficiently comprehensive to be used for answering some of the main questions with regard to the convalescence of survivors from chest wounds. Fuller and more detailed information upon the various points in the after-history of such wounds will not be available for the guidance of surgeons in the field until workers in England publish the fruits of their more careful inquiries in home hospitals.

For the returns that are here reviewed, the writer is indebted to the courtesy of many medical officers at home who have generously supplied the information asked for in the schedules issued by the Medical Research Committee. This information, in respect of many of the cases, unfortunately ends at the date in the clinical history when the patient was discharged from hospital, and a statement of "fit for duty" may mean no more than that the convalescent was classified as such by the estimate of the medical board. A statement of "fair result" indicates that convalescence had passed beyond all the lingering steps where a set-back might be apprehended, but that it had not yet ended in discharge from hospital. The majority of such cases might be looked upon as probably fit for duty in a little longer time; and, indeed, it will be observed in the subsequent tables of data that most of these returns of "fair result" were made in the second or third month after the wound—that is, at a date when it was naturally too early to expect that the case would have been finally disposed of.

Dr. Matthew Young, of the Statistical Department of the Medical Research Committee, gave most valuable assistance at this point, and traced 75 out of the total 170 beyond hospital to the duty which they were actually found to be capable of performing in the Army, or to their final discharge as unfit. For the rest of the cases Army records were not completely available at the time when this paper was written, and more time must elapse before these ultimate data can be collected.

An impression has been gaining ground, in the French service at any rate, that chest wounds are more fatal than was at first supposed. Whatever their mortality may be, it is certain that the deaths almost all occur in the first month, and that beyond this date the injury is neither of a fatal nor of a disabling character. A chest wound may invalid a soldier for two or three months if it is simple, or for any time up to a year if it has been accompanied by a large or by an infected effusion into the pleural cavity. But the ultimate recovery is very good, and relatively few of the survivors from such wounds need to be invalided out of the Army.

The periods of invalidism may be considered with reference to the occurrence of a sterile hæmothorax, whether aspirated or otherwise; of empyema, of pneumothorax, and of lung laceration. And each of these groups will require further analysis in respect of the nature of the original wound, as to whether it was caused by rifle bullet or by shell, and whether the projectile was or was not retained in the body. The clinical groupings rest upon an examination of each case made in France during the first and second week after the wound, at a time, that is, when the immediate results of the injury could be easily and completely identified. Owing to pressure of general work it was often impossible to ask for an accurate localisation of such projectiles as were retained in the thorax, and the statement of a foreign body being retained refers only to retention anywhere within the thorax in a position where it lay too deep to be felt by the fingers.

The patients were transferred to England in the third week after the wound, or a week or two later if an empyema had been drained by rib resection. The returns from home hospitals show that after this time it was very rare for any further intervention to be found necessary. There was never any fresh effusion that required aspiration. Sepsis developed in only three of the cases that were supposed to be sterile when they left France, and these were all examples of solidly clotted hæmothorax with retained projectiles. Necrosing fragments of rib had to be removed in a few cases, and there were two minor Estländer operations on old empyemata. Retained foreign bodies were rarely interfered with, and there was no history of their having led later to any characteristic troubles. There were no deaths in the United Kingdom, excepting a single case where an operation undertaken at the patient's request for the removal of a bullet was followed by a fatal pneumonia.

The number of cases, totalling 170, whose after-history in the United Kingdom was traced consisted of the following groups:—

Sterile hæmothorax	89
Septic effusion	64
Clotted hæmothorax, later septic	3
Sterile pneumothorax	6
Severe laceration of lung	2
No effusion	6

LACERATION OF THE LUNG.

It is difficult to select cases which will illustrate the recovery of a lacerated wound in lung tissue, because this condition is usually associated with the development of complicating factors, such as a hæmothorax.

An outstanding example may be quoted. The man was wounded by a bullet through the upper right chest. The entrance and exit wounds were large; offensive pus poured freely from both of them, and the track communicated with the bronchus. X rays showed a large tunnel blown clean through the lung, giving the appearance of a tuberculous cavity. The lung was everywhere in contact with the parietal pleura. After a period of dangerous sepsis the patient recovered rapidly, and in four and a half months he was back on duty in France. A similar case caused by a shrapnel ball had also healed soundly in five months.

Two examples of septic hæmothorax (anaerobe bacilli with streptococci), which were coughing up foul hæmothorax fluid in great abundance, recovered so rapidly after rib resection that they had rejoined for duty three and four months respectively after their wounds. Yet in these the lung must have been freely lacerated. Indeed, most lung wounds in this war are accompanied by laceration of greater or less degree; and yet the after-history of the hæmothorax cases in general fails to afford any indication that lung laceration needs to be reckoned with as a factor delaying convalescence.

The general conclusion to be drawn from this evidence is that laceration of the lung tissues is as readily repaired as it is easily inflicted. Insomuch as it is a vascular sponge, the lung is very tolerant of such injury, and scar-tissue quickly closes up the defect. Pneumonic inflammation, or gangrene, does not spread from the neighbourhood of the track, and even if the latter be septic, extending ulceration and secondary hæmorrhage are rarely to be feared provided that the wound in the lung be given free outward drainage. The influence of a foreign body retained in lung tissue is considered in a later section.

PNEUMOTHORAX.

A pure exogenous pneumothorax, in which air has escaped freely into the pleural cavity and yet the leak has not been accompanied by intrapleural hæmorrhage, is relatively rare, though not so uncommon as might have been expected from the fact that most of the wounds causing this condition have passed through the hilum of the lung.

Six cases appear in this group, of which three were examples of full pneumothorax with complete collapse of the lung; while in the other three the lung was only half collapsed, though it was everywhere separated by free air from the parietal pleura. There was neither free blood nor

serous effusion in the pleural cavity. The clinical diagnosis was in each case confirmed by the X rays. In only one of the six did it appear probable that the air had entered through the wound in the thoracic wall.

Only three of the cases were aspirated, with partial replacement of the air by oxygen on the thirteenth, nineteenth, and twentieth days respectively. Two others had a shrapnel ball and a shell fragment respectively retained in the chest, and these were not interfered with.

The result was that within two months of the wound all of the cases were free from any evidence of chest trouble, and three had already been discharged as fit for duty. The cases that were not aspirated had attained ultimate convalescence as rapidly as those which were aspirated. The latter treatment is therefore unnecessary, though it may be used in the second week to lessen discomfort and dyspnœa if the patient complains of the latter. Such aspiration has never in my experience led to any ill consequences.

From these results it is evident that a simple traumatic pneumothorax is a very benign condition. It is not likely to be followed by the later development of sepsis nor of a serous effusion. The diaphragm soon commences to move again on the injured side. There are none of the crippling restrictions to respiratory movements that usually persist with a lung that has collapsed beneath clotting blood; and expansion follows absorption of the air so rapidly that such casualties become fit for duty at fully as early a date as do others with simple through-and-through wounds of the lungs which were not complicated either by air leak or by internal hæmorrhage.

STERILE HÆMOTHORAX.

The evidence with regard to this group is incomplete in two respects. Since the smaller collections of fluid were looked upon as being of little interest, no attempt, as a rule, was made to trace their subsequent history, and therefore few of them appear in the table. Also, the largest effusions in this series were almost without exception emptied by aspiration in France, so that it is, unfortunately, impossible for me to quote cases from my own experience which would illustrate the after-history of a large non-aspirated hæmothorax in contrast with that of a similar condition treated by relatively early aspiration.

STERILE HÆMOTHORAX ASPIRATED.

The aspiration was generally performed on some day from the sixth to the twelfth after the wound, and oxygen replacement was used so as to enable the fluid to be removed as completely as possible at a single operation. Probably this was effected with fair success, and little was left behind except a collection of blood-clot which varied in amount from case to case in correspondence with the individual conditions of clotting in each.

A second aspiration was very rarely needed in France, and it never produced more than 10 oz. of fluid in any case. Only two of the cases were aspirated again in England, and one of them yielded only 2¼ oz. (after 63 oz. in France), and the other 12 oz. (after 70 oz. in France). Therefore it appears to be certain that a fresh accumulation of fluid, whether of blood or of pleural effusion, does not develop to any appreciable extent in sterile cases after the first complete aspiration.

The subsequent histories in England were obtained for a total of 67 aspirated cases. The details are given in the following tables. The statement that a man was sent to "furlough," or showed a "fair result" within three months, gives a strong probability that he would shortly be fit for duty; but in these cases the after-history could not be traced further. The figures in brackets for every group give the total numbers of months of invalidism for each patient before he was returned as fit for duty or otherwise reported upon. Thus 3 (4, 4, *6*) indicates that the 3 patients were marked for duty at the 4th, 4th, and 6th month respectively after their wounds. A figure in *italic* indicates that in this case the projectile was retained—for example, the case discharged at the sixth month in the instance just quoted.

Aspiration never caused any trouble or evidence of recurrent hæmorrhage, and not a single one of the cases so treated developed infection later in England. In some cases it was followed by most satisfactory results, so that several cases of large effusion were thereby got back to duty at almost as early a date as a man with no hæmothorax at all.

Thus one case, 60 oz. removed at one aspiration (shell retained), was back on duty in France 2½ months after his wound; and another of 64 oz. was on light duty at the end of one month. One officer, from whom 62 oz. had been removed, was met by me six months later in France, and he stated that his wind was as good as it had ever been in his life.

But despite these favourable cases, it will be evident from the tables that examples of large hæmothorax, on the whole, took longer to get back to duty than did the smaller effusions; and that the time of invalidism was progressively less prolonged in proportion as the original effusion was of smaller size.

The time of return to duty varied widely in the limits of each of the three groups. This difference may have been due to varying amounts of residual blood-clot, or to different standards of treatment by physical exercise at the various home hospitals at which they were received. The character of the wound in the thoracic wall would also affect the individual result. It should be noted that the retention of a foreign body did not seem to influence the time of return to duty.

There did not appear to be any clear difference in times of invalidism between those who were aspirated in the second and those in the third week after the wound. Certain cases that had been aspirated by Captain S. R. Armstrong, R.A.M.C., at an earlier date, on the third or fourth day, and came under my observation subsequently, seemed from their physical signs to be likely to give better results than those quoted in the following returns. But in these cases the complete history is lacking, so there is no actual proof of the probable advantage of a very early aspiration.

TABLE I.—*Sterile Hæmothorax Aspirated (Total 67 Cases).*

Large hæmothorax. 60 to 90 oz. of fluid (1700 c.c. to 2500 c.c.) removed at a single aspiration.

30 cases: 18 caused by bullet, 2 being retained.
12 ,, shell, 7 ,, ,,

—	In 3 months or less.	After 3 months.	Total.
To duty ...	6 (1, 2, 2½, 2½, 3, 3).	11 (4, *5*, 6, 6, 7, 7, 8, 8, *9*, *11*, *15*, the last 4 being in France at that time).	17
To furlough	3 (1, 2, 2).	—	3
Fair result	9 (1, 1¼, *1¼*, 1½, 1½, 2¼, 2½, 2¾, *3*).	—	9
Unfit	—	1 (owing to paral'y of arm).	1

Medium-sized hæmothorax, yielding from 35 to 60 oz. of fluid at a single aspiration.

24 cases: 19 caused by bullet, 5 being retained.
5 ,, shell, 1 ,, ,,

—	In 3 months or less.	After 3 months.	Total.
To duty ...	6 (1¼, *2*, 2½, 2½, 2½, 3).	5 (4, 4, 5, 5, 5).	11
To furlough	3 (1½, 1½, *2*).	—	3
Fair result	8 (1, 1¼, 1½, 1½, 1½, *1½*, 1¾, 2¼).	—	8
Unfit	1 (succumbed to operation *1¼*).	1 (*5*, by traumatic neurasthenia)	2

Small hæmothorax, yielding 20 to 30 oz. with a varying amount of residual clot.

13 cases: 11 caused by bullet, 3 being retained.
2 ,, shell, 1 ,, ,,

—	In 3 months or less.	After 3 months.	Total.
To duty ...	5 (2, 2½, 3, 3, *3*).	3 (*4*, *4*, *6*) (all in France).	8
To furlough	1 (3).	—	1
Fair result	2 (1, 1½).	—	2
Unfit	—	2 (7, from traumatic neurasthenia; 8, from paralysed arm).	2

LARGE CLOTTED HÆMOTHORAX.

Three examples of this condition were traced. In each of these aspiration had been attempted by me in France with a yield of only 10 to 20 oz., where at least 50 oz. had been

looked for. The physical signs remained without change, and the patients were evacuated to England in the belief that the massive residuum of blood clot was sterile.

All three were subsequently resected in home hospitals. In each of them the projectile, one bullet and two shell, had been retained. The results were:—

2, shell retained, both resected for empyema (organism not stated); one discharged to duty in four months from wound, and one practically well at that time.

1, bullet retained, resected and drained for "blood clot"; discharged unfit at seventh month.

It is paradoxically true that recovery of the chest from the crippling results of a large hæmothorax may be more rapid if sepsis occur than if the collection remains sterile; for the digestive processes of infection are able to discharge with great rapidity through a drainage opening the fibrinous masses of blood clot that otherwise might have continued to resist the expansion of the lung in its lower half.

STERILE HÆMOTHORAX, NOT ASPIRATED.

None of the 22 cases of hæmothorax which were not aspirated developed any further complications at home, and the small effusions were discharged for duty at about the third month. The results were fully as good as those of any aspirated cases. (Table II.)

TABLE II.—*Sterile Hæmothorax, not Aspirated (Total 22 Cases).*

Moderately small hæmothorax, estimated at 20 to 40 oz., with dullness extending well into the axilla.

11 cases: 5 caused by bullet, 1 being retained.
6 ,, shell 4 ,, ,,

The retention of a shell fragment did not appear to influence the date of return to duty.

—	3 months or less.	After 3 months.	Total.
To duty ...	7 (1¼, 2, 2, 2, 2¼, 3, 3).	3 (6, 6, 7. One at 6 being a double hæmothorax. One in France at 11).	10
To furlough	1 (3).	—	1

Small hæmothorax, not reaching into axilla.
11 cases: 9 caused by bullet, 2 being retained.
2 ,, shell, 2 ,, ,,

—	3 months or less.	After 3 months.	Total.
To duty ...	7 (1¼, 1½, 1¾, 2, 2, 2, 3).	3 (4, 6, 8. Two in France at eighth month).	10
Fair result	1	—	1

No hæmothorax. The only uncomplicated cases were the two returned as "for duty" and "fair result" at three weeks; the rest cannot be justly quoted in comparison.
6 cases: 3 caused by bullet, 2 being retained.
3 ,, shell, 1 ,, ,,

—	3 months or less.	After 3 months.	Total.
To duty ...	2 (3 4, 2½).	1 (5)	3
Fair result	3 (1, 1¾, 2).	—	3

Therefore it is not necessary to aspirate small effusions of about 30 oz. which extend half-way into the axilla and do not cause much cardiac displacement. Indeed the combined Tables III. and IV. of total results show a much more satisfactory recovery for the non-aspirated than for the aspirated cases of hæmothorax, and might be quoted in respect of a routine policy of non-interference. But the comparison is unfair on account of the small size of the non-aspirated effusions. The large effusions that were aspirated gave tolerably good results. At least 30 per cent. of them were well again within three months. So rapid a recovery could not have been attained without aspiration. Medical officers in England have described the late results of a large non-aspirated hæmothorax as being most unsatisfactory, the lung remaining collapsed and the chest expanding very poorly. My tables fail to bring out this type in contrast to the others, because all the cases of large hæmothorax in this series were aspirated.

Tables III. and IV. summarise the general results, and show that the recovery of a case of sterile hæmothorax was not influenced by the retention of a projectile.

TABLE III.—*Sterile Hæmothorax: Aspirated Completely.*

—	Bullet.		Shell.		Total.
	Out.	Retained.	Out.	Retained.	
Duty.					
3 months or less	11	2	2	2	17
After 3 months	8	2	4	5	19
Total for duty	19A	4	6	7	36
Fair result (not finally classified)	18	3	2	3	26
Unfit	2B	3C	—	—	5
Total...	39	10	8	10	67

A, All returned to duty in less than six months.
B, Both invalided owing to paralysis of arm.
C, Two invalided by traumatic neurasthenia, and one died at fifth week after operation in the United Kingdom for removal of the bullet.
7 cases were traced back to full duty in France.

TABLE IV.—*Sterile Hæmothorax: Not Aspirated: Small Size.*

—	Bullet.		Shell.		Total.
	Out.	Retained.	Out.	Retained.	
Duty.					
3 months or less	8	1	2	3	14
After 3 months	2	2	—	2	6
Total for duty	10	3	2	5	20
Fair result (not finally classified)	1	—	—	1	2
Unfit...	—	—	—	—	—
Total...	11	3	2	6	22

SEPTIC HÆMOTHORAX (64 CASES).

The original volume of blood in these varied greatly, and in a few there was probably no hæmothorax, but simply an infected pleural effusion. The grouping of the cases is made according to the chief forms of infecting organisms. Actually this distinction has little value with regard to the total time of invalidism of a case after drainage. It is true that the nature of the infecting organism is all important in a consideration of the mortality from the various forms of septic hæmothorax in the first two weeks. But when once the danger to life has been averted by a satisfactory drainage of the pleural cavity, all the infections soon assume a common character, and the mingled secondary growths on the suppurating pleura are probably much the same in all open empyemata.

The period of convalescence will thenceforward be determined by the size of the cavity and by the nature of the collapse of the lung and the thickness of the fibrin coat overlying it. The time must also vary considerably in relation to the skill and energy with which the empyema cavity was treated in the various hospitals in the United Kingdom where each patient was received, for it is certain that systematic breathing exercises combined with antiseptic lavage of the cavity will hasten the closure of the sinus. Much depends, too, on a proper placing of the original drainage opening and a satisfactory removal of carious ribs. For these separate reasons the final figures must be considered only on a very broad average of the results that they show.

The tables which follow are constructed upon a plan similar to that used for sterile hæmothorax, and retention of a projectile is indicated in the same way by a figure in *italic*. An empyema of large size (estimated above 50 oz.) is indicated by an asterisk to the figure of time of recovery for each individual case.

The general times of recovery are fairly illustrated by the following case. The patient was wounded in the right chest in 1915, and a sterile hæmothorax was aspirated. In six months he was back on full duty in France and felt no disability. In 1916 he was again wounded, this time in the left chest, and a large hæmothorax resulted which on a first aspiration yielded 80 oz. freely infected with staphylococci. After rib resection he was dangerously ill and semi-delirious for a week, but in 2½ months the sinus was closed, and in six months he was again reported fit for duty in England.

EMPYEMATA.

TABLE V.—*Infections by Gas-producing Anaerobic Bacilli only*

23 cases: 6 caused by bullet, 1 being retained.
17 „ shell, 7 „ „

There was no obvious difference between early and late resections in respect of return to duty. One patient, though infected, was treated by aspiration only in France, but he had to be resected in the United Kingdom, and was discharged unfit at the end of the fifth month. It is difficult to estimate the influence of the size of the collection of fluid, because the ultimate pyo-pneumothorax may be large when the original hæmothorax was small. The retention of a shell fragment certainly had an unfavourable influence on return to duty.

—	In 6 months or less.	After 6 months.	Total.
Duty	8 (3*, 3*, 3, 3, 4, 4*, 5, 5).	2 (12*, *18*).	10
Fair result (sinus closed)	4 (2½, 3*, 3*, 4*).	1 (7*).	5
Unfit	4 (4*, 5*, 6*, 6*).	4 (7*, from duty at 6*) 7, 8*, 12*).	8

TABLE VI.—*Infections by Gas Bacilli Combined with Streptococci, &c.*

9 cases: 3 caused by bullet, 0 being retained.
6 „ shell, 3 „ „

These were chiefly resected in the second or third week.

—	In 6 months or less.	After 6 months.	Total.
Duty	1 (4).	3 (7, 8*, 8, of whom 2 in France at 11 and 12)	4
Fair result (sinus closed)	3 (2, 3, 5).	—	3
Unfit	1 (6*).	1 (at *15*, after light duty at 7).	2

TABLE VII.—*Infections by Streptococci and Staphylococci either Alone or Commingled.*

These groups are thrown into a common table. The separate results were:—

Streptococci alone ... ... 7 cases: 2 fit for duty, 4 unfit.
Staphylococci alone... ... 4 „ 2 „ „ 2 „
Strept. and staph. mixed 5 „ 3 „ „ 2 „

There were two cases, afterwards classed as unfit, upon whom minor Estländer operations were performed.

Total cases, 16: 10 caused by bullet, 0 being retained.
6 „ shell, 3 „ „

—	In 6 months or less.	After 6 months.	Total.
Duty	6 (4½, 5*, 5, 5½, 6*, 6*).	1 (10*).	7
Fair result (sinus closed)	—	1 (8).	1
Unfit	2 (4½*, 5*).	6 (7, 9, 9*, *12*, 14, from Reserve Battn. at 6, *16* from light duty at 8).	8

TABLE VIII.—*Infections by Pneumococci (8) and Influenza Bacilli (2).*

10 cases: 5 caused by bullet, 0 being retained.
5 „ shell, 2 „ „

All the cases with large collections returned to duty, one being back in France in the fifth month. Late resections were fully as satisfactory as early ones.

—	In 6 months or less.	After 6 months.	Total.
Duty	2 (5*, 5).	4 (7*, 9, *10*, 12*, when in France).	6
Fair result (sinus closed)	2 (2½, 4).	1 (7, invalided by rheumatic fever).	3
Unfit	—	1 (7).	1

TABLE IX.—*Various Infections.*

B. coli, 2; Diphtheroid bacilli, 2; *B. mycoides*, 1; a spirillum, 1. The case of *B. mycoides* and one of the diphtheroid were resected later in the United Kingdom after the infection had been treated in France by aspiration only in the hope that it might subside.

6 cases: 2 caused by bullet, 1 being retained.
4 „ shell, 3 „ „

—	In 6 months or less.	After 6 months.	Total.
Duty	1 (4*).	1 (8*).	2
Fair result (sinus closed)	3 (3, 4, 4*).	—	3
Unfit	1 (6*).	—	1

The after-results of the different infections are all combined in the next Table, No. X. The sinus had closed by the third or fourth month in a large proportion of the cases, and nearly one-third were fit for duty in six months or less. In the whole series there were only two cases in which a minor Estländer operation was performed in England. None died. But at least one-third of the empyema cases had ultimately to be discharged as unfit simply on account of the chest condition, whereas there were none such in the sterile hæmothorax group.

The original size of the empyema did not affect the ultimate classification of the convalescent as much as might have been expected. About one-half (31) of the 64 empyemata had been of large size—that is, roughly 50 oz. or more; and about one-half of the unfit and one-half of those fit for duty were found to have belonged to the group of large empyemata. The large sterile hæmothorax got back to duty equally soon, whether caused by bullet or shell, and whether the projectile was or was not retained. But a retained foreign body in the septic cases did cause unfitness. Thus in the latter group:—

For 44 projectiles not retained there were 9 unfit = 20%.
„ 20 „ retained „ „ 11 „ = 55%.

TABLE X.—*Total Results of Empyemata (64 Cases).*

—	Bullet.		Shell.		Total.
	Out.	Retained.	Out.	Retained.	
Duty.					
6 months or less	9	—	6	3	18
After 6 months	4	1	4	2	11
Total for duty	13	1	10	5	29
Fair result (not finally classified)	4	—	8	3	15
Unfit...	6	1	3	10	20
Total	23	2	21	18	64

4 of those marked unfit were found to be so after several months of light duty, and 3 of these had retained shell fragments. 7 cases were traced back to full duty in France within a year of their wounds, and 2 of these had had large empyemata.

THE MORTALITY AMONG CHEST WOUNDS IN FRANCE.

The figures that have been given in the preceding tables may be taken as a fair index of what is the after-history of chest wounds that have survived to be sent across the Channel under the present established methods of treatment.

During the last nine months, however, the opinion has been gaining ground that better results might be obtained by more active surgery undertaken as soon as possible after the wound was inflicted. French surgeons have felt this strongly, and in order to accumulate such evidence as was needed for arriving at a decision on the matter the subject was formally inscribed on the order of the day of the French Society of Surgery on Nov. 29th, 1916. Since that date numerous papers and important series of statistics bearing on the question have appeared in the weekly *Bulletins de la Société de Chirurgie de Paris*. It is argued in these papers that the mortality from chest wounds is much higher than was at first supposed, and that this high mortality requires vigorous efforts on the part of surgeons to save life. Also, in respect of casualties who survive these wounds, evidence is brought forward to show that retained projectiles, and especially shell fragments, almost always cause trouble, either by the introduction of sepsis, or, if

sterile, by the introduction of later pathological changes or symptoms that incapacitate the patient for service.

In consequence of these views it has been urged by several surgeons that the routine treatment of chest wounds should include:—

1. The operative closure during the first 24 hours of all chest wounds that remain open with air suction (traumatopnœa) or free bleeding from within. This surgery should be accompanied by a careful cleansing and closing of any wound in the lung as well as of the pleural cavity if any blood has been effused into the latter. Drainage at an early date is to be avoided.

2. The removal of all shell fragments, other than those of small size, which are proved to be retained within the chest. This should be done also in the first 24 hours, and should be accompanied by a similar cleansing of the wound track, by suture of lacerated lung, and evacuation of the blood clot from the pleural cavity with subsequent closure of the incision in the thoracic wall in the hope that the development of sepsis will be thereby prevented.

3. The removal from the thorax of all other retained foreign bodies at a much later date when the possibility of septic complications has passed away. Duval's method of open operation and that of Petit de la Villeon (Jan. 10th, 1917) have been freely used for this purpose and with complete success.

Treatment on these lines would aim at saving lives that might be lost from primary hæmorrhage or from fulminating sepsis, and at lessening the periods of invalidism that result from the development of an empyema or from residual blood clot, and perhaps, too, from retained projectiles in the chest.

It has been fully demonstrated by such French surgeons as Pierre Duval, and independently by several surgeons in our medical service, of whom Gask and Gray have been the pioneers, that these thoracic operations are quite practicable under military conditions in the field. This in itself is a most important advance, for it shows that the pleural cavity may be freely opened under ordinary local or general anæsthetics and the lung manipulated without any fear of immediate physiological disturbances. Only it is essential that infection shall neither be spread broadcast by the operation nor introduced by drainage of the pleural cavity at the end of the operation. The procedure demands skill in execution as well as judgment in the choice of the case, and the results, though often strikingly successful, are not always favourable. For this reason it is desirable to test by general statistics the results of treatment by the earlier conservative policy and to see in what group of chest wounds it is reasonable to anticipate any improvement.

Deaths after chest wounds are caused either by primary hæmorrhage or by infection in the chest, or they may follow upon complicating wounds, and in particular those of the abdomen or spine. All deaths that occur from uncomplicated chest wounds in the first day may fairly be ascribed to primary hæmorrhage. From the second day onwards it is infection that kills the man—infection either within the thorax or in other complicating wounds, and especially those of the abdomen. Pneumonia or purulent bronchitis is occasionally met with as a fatal factor in chest wounds.

Hæmorrhage may be caused by any form of projectile, but sepsis is at least twice as frequent with wounds by shell fragment as with those by rifle bullets. Statistics, if complete, would therefore be required to show the cause of death in all fatal cases, the proportion of septic cases among all chest wounds and the association of these particular consequences with the different types of projectile that had inflicted the wound, and with the retention or otherwise of the foreign body. In respect of sepsis it is also desirable to form a separate class of large open wounds in the chest wall through which there is free air suction and leakage of blood, for these, whether caused by bullet or shell, are a particularly fatal group. If full statistics of this nature were available it would be possible to determine the types of wound that ought, in view of their peculiar fatality, to be dealt with by immediate surgery in the first 24 hours after their infliction.

Statistics as to Mortality of Chest Wounds.

From the various statistics quoted by French observers Duval[1] took round figures suggesting that out of pure chest wounds that have survived to be carried off the field of battle there is a total mortality of more than 50 per cent. when the deaths at successive medical units from front to rear are added together. And Maisonnet asserted that very few of the survivors can return to full duty.

Grégoire's figures (Feb. 7th, 1917) for work at an Auto-chir, where the wounded men were kept under observation for three weeks, were more favourable than these general results. In 404 cases of pure chest wounds there were 47 deaths—that is, 11·7 per cent.; 57 cases, or 14 per cent., of the total were resected for empyemata, and of these there were 26, or 45 per cent., that died.

The statistics given by Depage (Dec. 20th, 1916) from the special hospital at La Panne, where casualties are received from two to six hours after their occurrence and are detained until convalescence, are of particular value, because this arrangement enabled more complete records to be kept.

In a series of 320 pure chest wounds there were 59 deaths—that is, 18·4 per cent. Of these, 30, or 9·4 per cent. of the total, died in the first 24 hours—that is, from hæmorrhage and shock. The later deaths, presumably from sepsis, formed only 10 per cent. of the total survivors. Depage, in comment upon these relatively satisfactory figures, emphasises the fact that rather more than half of the casualties were caused by rifle bullet; and he gives the important analysis that the mortality of the latter was only 11 per cent., whereas it was 29 per cent. with wounds by shell fragments.

The figures of Depage approximate very closely to the generally favourable results that appear in the British Medical Service.

For deaths from hæmorrhage and severe injury in our field ambulances no reliable figures have been collected.

The returns for casualty clearing stations have in consequence not been adequately controlled by reference to the possibility of men with severe injuries being detained to die at medical units in front of the casualty clearing station level. Sir Wilmot Herringham[2] observed at a casualty clearing station a series of 211 consecutive cases from the fighting on the Somme. There were 22 deaths, but when fatal injuries of the spine and abdomen were excluded, the mortality was only 7·3 per cent. This figure is slightly less than the 10 per cent. mortality quoted for two stations near the Ypres salient in the first year of the war.

But later records from casualty clearing stations sited a little nearer the line, which were not covered by retaining traps at the field ambulances in front of them, have given a death percentage in pure chest wounds of about 20. Of these, roughly one-half died at an early hour from severe injuries, while the remaining 10 per cent. succumbed to septic complications. Since death statistics of chest wounds have not been collected from the field ambulances for the earlier period when the severest cases tended to be retained at these front units, it is impossible to decide whether the practice of passing chest wounds rapidly on to the casualty clearing stations may tend to increase their mortality. The fact remains that under the non-operative method of treatment in vogue in the spring of 1917 the mortality at casualty clearing stations was about 20 per cent. Very few die at field ambulances.

The entire mortality in medical units in the Army area must therefore be rather less than 25 per cent. In this reference it should be borne in mind that Depage's figures show that any total percentage of mortality is largely influenced by the nature of the fire to which the men have been exposed.

From the base hospitals on lines of communication sufficient cases have been collected to give definite information. The general mortality at the base, to which chest wounds are transferred at a date from the third day onwards, is well below 10 per cent., and when complicating wounds are excluded it falls to about 5 per cent., the fatal factor in all these cases being sepsis. But in that special group of chest wounds where sepsis develops the mortality is persistently high, varying from 20 to 40 per cent. in accordance with the skill of treatment.

The following analyses upon which these general statements are based were kindly given by Lieutenant-Colonel H. Pinches, and by Major W. S. Dickie, Major D. H. de Souza, and Captain Fortescue-Brickdale, from complete records supplied by the officers commanding each hospital.

[1] Bull. Soc. Chir., Paris, Dec. 13th, 1916.

[2] Quart. Journ. Medicine, January, 1917, p. 79.

C— General Hospital.—Receiving relatively light cases: period November, 1915, to June, 1916.
161 pure chest wounds: 4 deaths = 2·5 per cent. (also 1 death from abdominal combined with chest wound).
Septic cases: 18 = 11·2 per cent. of total, or 15·4 of those with effusion.
Septic deaths: 4, or 22·2 per cent. of septic cases.

—	No hæmothorax.	Sterile effusion.	Septic effusion.	Total.	Deaths.
Rifle bullet	10	32	3	45	—
Shell	10	22	14	46	4
Not stated	24	45	1	70	—
	44	99	18	161	4

O— Stationary Hospital.—Selecting the serious cases out of convoys intended for C— General Hospital named above: period January to July, 1916.
64 pure chest wounds: 7 deaths = 11 per cent.
Septic cases: 10 = 15·6 per cent. of total, or 28·5 per cent. of those with effusions.
Deaths in septic cases = 5, or 50 per cent. of the septic cases.

B— General Hospital.—Receiving severe cases: period November, 1916, to May, 1917.
296 pure chest wounds: 23 deaths = 7·7 per cent.
Septic cases: 49 = 16·7 per cent. of total, or 24·0 per cent. of those with effusions.
Deaths in septic cases = 32 per cent. during period of January to May.
Projectiles: 25 per cent. of the septic cases were through-and-through wounds without retained foreign bodies.
Among 106 cases submitted to X ray examination, chiefly because they showed only an entrance wound, the results were:—

—	No hæmothorax.	Sterile effusion.	Septic effusion.	Total.
Projectile seen to be retained	33	32	18	83
Nothing seen by X ray	7	13	3	23

B— Stationary Hospital.—Receiving relatively light cases: period June to December, 1916.
155 chest wounds, 5 deaths = 3·3 per cent. (also 3 deaths from abdominal combined with chest wounds).
Septic cases, 18 = 11·3 per cent. of total, or 14·0 per cent. of those with effusions.
Deaths in septic cases, 5, or 27·5 per cent.
Projectiles: retained in 64 cases (49 shell), 4 deaths, all from shell.
Not retained in 73 cases (44 shell), 3 deaths, one from shell.
No statement for 21 cases: 1 death.

The entire total of 676 cases of pure chest wounds on lines of communication yields the following figures:—

General mortality on the lines of communication ...	5·8 per cent.
Deaths in septic cases	40·0 ,,
Proportion of septic cases to all	14·0 ,,
Incidence of sepsis in cases with effusion	20·0 ,,

These figures are more favourable in respect of the incidence of sepsis than those which I analysed in a paper with Colonel Bradford,[3] and they are nearer the truth because they include all the cases admitted to the hospitals during the period under review; but even so they are unfairly weighted by severe cases, because two out of the four hospitals were receiving centres for specially severe cases.

Under the conservative policy of surgical non-interference with chest wounds at the onset, the general results may therefore be very broadly stated as follows:—

Estimated mortality in field ambulance and casualty clearing station, 20 to 25 per cent., of which 10 to 15 per cent. are the early result of shock and hæmorrhage, while 10 per cent. die from sepsis.	
Actual mortality on lines of communication	5 per cent., all from sepsis.
Actual mortality in England...	Practically nil.

The mortality from *hæmorrhage and shock* is about half of the total death-rate in casualties admitted to medical units, though it is not a heavy percentage upon the entire number of bleeding wounds. The surgeon at the front sees directly from his own experience which are the cases that are liable to die from such injury, and he can at once judge the possibility of saving some of them by early operation.

With *infection* the question is more difficult. The mortality from sepsis, when deaths at the casualty clearing station are added to those at the base, probably rises to nearly 50 per cent. in the cases of hæmothorax where infection has developed, and of those who survive after surgical treatment of the empyema at least one-third will need to be invalided out of the Army. The group in which a septic hæmothorax occurs is therefore one of most serious importance, and every possible means should be considered for dealing more efficiently with it. The hope raised by recent progress in chest surgery is based upon preventive measures, and it is undeniably true that in certain cases an early operation has eradicated an infection that would otherwise have burst out into an empyema.

Statistics, however, show that certainly not more than 25 per cent. of untreated chest wounds develop this dangerous sepsis, so that it is plain that some selection of cases for operation must be made on the first day so as to choose only those which are likely to develop this complication. The following groups have been considered from the point of view of arresting infection.

Grouping of Cases in regard to Early Surgical Intervention.

A. Those with air-suction and blood-leakage through open holes that are obviously too large for early spontaneous closure. The mortality in these, when left with nothing but an occluding pad, is exceedingly high. Very few are seen to arrive at base hospitals and these generally succumb a few days later unless they are of the favourable type where the wound is near the base of the chest and so chances to provide satisfactory drainage. The gravity of the condition is due to the fact that the lung collapses away from the chest wall everywhere, thus leaving for the absorption of septic products an enormous surface of pleura uncovered by blood clot. With a closed hæmothorax septic absorption is much slower and less dangerous. The statistics quoted above do not clearly distinguish this group of cases, but the experience of every surgeon is agreed as to their serious nature if left without early operation.

Grégoire[4] closed 17 of such cases at an early hour; only one died and the remainder recovered without the development of an empyema. All surgeons who have attempted operative treatment for these cases have had the satisfaction of some favourable results.

B. Tangential wounds with severely comminuted ribs, in which there may be continued bleeding from intercostal vessels, while the lung is generally mangled near the wound. Such cases are liable to develop a most serious streptococcal infection if the wound track be not immediately cleansed.

C. Those with large retained fragments of shell. In the majority of such wounds death follows soon from hæmorrhage. Nearly all the survivors develop gross infections with anaerobe bacilli and streptococci. The wound track in the lung often holds infected fragments of rib or shreds of dirty clothing even at a distance from the lodging place of the projectile, and the latter almost always carries dirt upon it.

A few of the casualties in this group do survive at the base, if the resultant empyema chances to be well localised and is properly drained. It remains for surgery to prove whether expectant treatment or immediate attempts to clean the wound in chest and lung more or less completely by early operation will yield a lower death-rate.

D. The group of those with small retained projectiles, either shell or rifle bullet. Here some conclusions can be justly derived from general figures, despite the meagre nature of those that are available.

Roughly 25 per cent. of cases of hæmothorax develop sepsis, and out of these infected men 10 or 12 will die, either at the front or at the base. But several of these septic cases must belong to Groups A, B, or C; others are caused by through-and-through wounds. The statistics from General Hospital B——, quoted earlier in this paper, show that 25 per cent. of all the septic cases, fatal or otherwise, were due to through-and-through wounds. The actual mortality from sepsis in Group D must consequently be small.

In a consecutive series of 53 autopsies made at a base hospital in septic deaths from pure chest wounds projectiles were found to be retained in the lungs in only 9 cases, or 17 per cent. In 3 out of these 9, death was directly due to secondary hæmorrhage caused by sepsis around the retained foreign body in the lung. The figures for the 53 septic deaths were as follows:—

Through-and-through wounds, foreign body not retained, 23, or 43 per cent., 7 being by shell.
Penetrating wounds, foreign body retained, 30, or 57 per cent., which included 25 by shell, of which 8 had foreign body in lung; 5 by bullet, of which 1 had foreign body in lung.

[3] British Journal of Surgery, vol. iii., 1915, p. 247.

[4] Loc. cit.

From these autopsy records it is evident that the retention of a foreign body does not bear any very close association with the fatal forms of septic hæmothorax that occur at the base hospitals.

Foreign bodies are retained in a large number of chest wounds, but even when embedded in the lung they frequently do not lead to the development of sepsis. Thus out of 83 clinically suspicious cases on the lines of communication in which a projectile was seen by X rays to be retained, only 21 per cent. developed empyemata.

Nor is there any satisfactory evidence from the British Medical Service that a retained foreign body in non-infected cases does subsequently cripple the soldier. The 89 examples of sterile hæmothorax quoted in Tables III. and IV. of this paper had projectiles retained in 32·5 per cent. of them. Yet the only one who suffered from the retention was the patient who died in consequence of an operation for the removal of a harmless bullet. Colonel R. D. Rudolf, C.A.M.S., has kindly informed me that in his experience as consultant to a large number of Canadian hospitals in England he has met with no satisfactory proof that a soldier is incapacitated by a retained body in the chest, provided that sepsis had not developed at the time when the casualty was incurred. Until further proof to the contrary is produced, no good reason appears at present to justify early operations on cases with small retained projectiles or simple hæmothorax. The former cause an empyema or later troubles in only a small proportion of the cases. The sterile hæmothorax clot does not invalid a man for an indefinitely long period. Therefore it does not appear advisable, in the light of present knowledge, to operate as a routine simply in order to clear away hæmothorax clot and to remove a small foreign body.

But in certain carefully chosen cases the fresh work of surgeons has proved that early operations are more than justifiable, they are indeed urgently called for. Such operations may succeed in arresting deadly hæmorrhage, and it is beyond all doubt that they can abort the development of a grave infection in types A, B, and C. With these infecting groups of wounds, as with those where the abdomen as well as the thorax is implicated, the recent advances in chest surgery have already given brilliant results and succeeded in saving lives that would otherwise have most certainly been lost. The last paper of Pierre Duval[5] recounts many such achievements by the French, and equally happy results have rewarded the skill of surgeons with our own armies.

SUMMARY.

The chief practical points of this paper may be summarised as follows:—

1. A sterile hæmothorax of moderate size, that is, of about 30 oz., will recover as rapidly by natural absorption as by aspiration.

2. The retention of foreign bodies in the chest in aseptic cases does not appear to exert any crippling effect for military service, but more accurate information is urgently needed on this point.

3. Cases of infected hæmothorax that have been drained in France and transferred to the United Kingdom generally recover rapidly and completely. None die, and subsequent operations are rarely needed. More than one-half of these empyema cases can be returned to duty.

4. The late mortality from chest wounds is practically nil in England, and it is only 5 per cent. on the lines of communication in France; but in the area of the armies it is higher than was at first supposed. About 10 or 15 per cent. may die in medical units at an early date from the severity of the injury and about 10 per cent. may die later at the casualty clearing station from complicating sepsis.

5. Among those casualties which develop sepsis within the chest the mortality is very high, rising to nearly 50 per cent. under the present system of treatment by rib resection and drainage.

6. The old conservative routine of surgical non-intervention, except by late drainage, finds its justification only in the satisfactory recovery of those cases of gunshot wound of the chest which remain non-infected—that is, about 75 per cent. The high mortality in those which develop sepsis demands a wider practice of the new prophylactic method of cleansing operations, performed at an early hour on certain carefully chosen groups of cases.

[5] Bull. Soc. Chir., Paris, June 19th, 1917.

PURULENT BRONCHITIS: ITS INFLUENZAL AND PNEUMOCOCCAL BACTERIOLOGY.

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Introduction.

DISEASES of the respiratory system which come under observation in the Aldershot Command are notorious for the inclusion of a large percentage of atypical cases. Taking the pneumonias, for example, a certain number conform with the book descriptions and pursue the orthodox course, but the majority, though undeniably lobar pneumonia, are, nevertheless, anomalous in many particulars. Furthermore, they pass without any definite line of demarcation into cases which are definitely broncho-pneumonia, and these in turn grade off without any well-defined boundaries into conditions which some would diagnose as broncho-pneumonia, others as bronchitis of varying type and severity, finally to present, at the end of a series, cases of frankly simple bronchial catarrh.

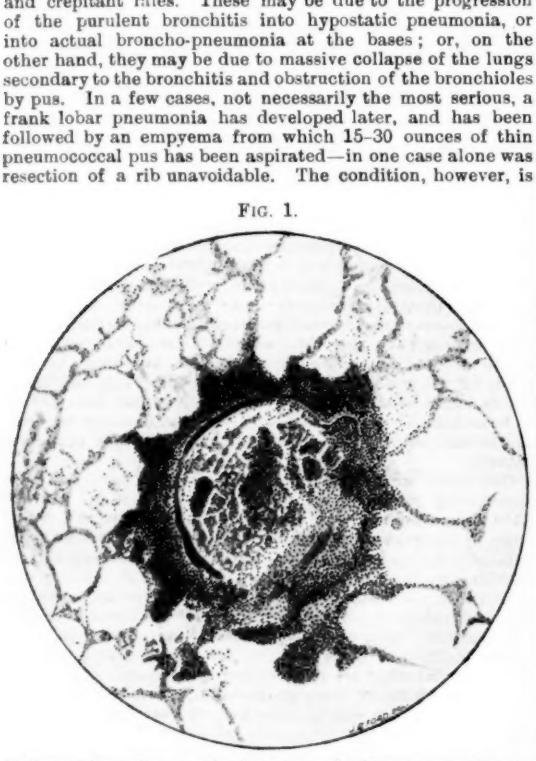
One point which has impressed all who have had the opportunity of engaging in military practice in the Aldershot Command for any length of time is the occurrence of a considerable number of cases of a definite type, clinically recognisable almost at sight, yet different from anything we have been familiar with in men of military age in civil life. To this peculiar type of case we have applied the designation "purulent bronchitis" on account of the characteristic nature of the expectoration. Whether or no we are justified in dignifying this sort of case as a clinical entity, or whether we are dealing with cases of modified simple bronchitis or broncho-pneumonia, we feel that it is desirable to draw special attention to them for two chief reasons. In the first place, the affection has a very high mortality—very much higher than that of lobar pneumonia; secondly, there are features and circumstances which suggest an epidemic nature.

A Typical Case of Purulent Bronchitis.

A typical case is as follows. The onset is usually acute; the early symptoms are those of a "cold in the head." The temperature may be 101° or 102° F., but there are no features to distinguish the condition from acute "coryza" or febricula, so that in the majority of cases the patient does not report sick for two or three days, by which time he is sent to hospital. At this stage two features attract particular attention. First, the character of the expectoration: this consists of thick pale yellow dollops of almost pure pus, not the frothy expectoration familiar in ordinary bronchitis; it has no particular odour and it becomes increasingly abundant until in a day or two it may amount to several ounces in the 24 hours. Secondly, the rapidity of the patient's breathing: this may be so evident that pneumonia suggests itself, yet on examining the chest the only physical signs consist of few or many rhonchi scattered widely, but most marked at the bases of the lungs behind, associated with wheezy vesicular murmur; resonance everywhere is unimpaired and bronchial breathing is absent. The characters of the temperature, pulse-rate, and respiration-rate are exemplified below. A little later a third point attracts notice: a peculiar dusky heliotrope type of cyanosis of the face, lips, and ears, so characteristic as to hall-mark the nature of the patient's malady even on superficial inspection. By this time dyspnœa is very pronounced; respiration consists of short, shallow movements, which in bad cases

amount almost to gasps, reminiscent of the effects of gas-poisoning. Recovery at this stage may occur, but by the time the cyanosis has become at all pronounced the prognosis is extremely bad, though the number of days the patient may still live in spite of the severity of his distress is often surprising. The character of the sputum remains the same throughout, though sometimes it is blood-tinged or actual blood may be expectorated instead of, or in addition to, the more typical pale yellow pus. In the later stages of the illness areas of impaired note or of actual dullness may be found, particularly over the posterior aspects of the lungs, associated with bronchial breathing and crepitant râles. These may be due to the progression of the purulent bronchitis into hypostatic pneumonia, or into actual broncho-pneumonia at the bases; or, on the other hand, they may be due to massive collapse of the lungs secondary to the bronchitis and obstruction of the bronchioles by pus. In a few cases, not necessarily the most serious, a frank lobar pneumonia has developed later, and has been followed by an empyema from which 15–30 ounces of thin pneumococcal pus has been aspirated—in one case alone was resection of a rib unavoidable. The condition, however, is

FIG. 1.



Section of lung tissue, under low power of microscope, showing the alveoli to be hardly affected at all, while the bronchiole is filled with cells and débris, and its wall and the immediately surrounding parts are characteristically infiltrated with small round cells.

not primarily a lobar or a broncho-pneumonia, but a bronchitis, and although a small amount of basal broncho-pneumonia has been present in one or two of our post-mortem examinations, in other fatal cases there has been no broncho-pneumonia at all, not even the smallest portions of either lung being found to sink in water.

We have no doubt that the condition is primarily an affection of the bronchi and bronchioles, and not of the alveoli, though the alveoli may be affected later if the patient survives long enough. In a typical post-mortem examination it would be difficult, or almost impossible, to define the actual cause of death unless one knew the clinical history. The heart is generally dilated moderately as to its right side, but this dilatation is seldom enough to attract a great deal of attention in itself. The lungs may exhibit basal areas of broncho-pneumonia or superficial areas of collapse over the backs of the lower lobes, as described above, or there may be a little dry pleurisy, but in the majority of cases there is no pleurisy, no broncho-pneumonia, no collapse, and at first sight the lungs look perfectly normal. On incising and squeezing a piece of lung, however, the thick yellow pus, sometimes altered to a dirty grey colour as the result of the post-mortem changes, can be seen bubbling out of nearly all the bronchioles. All the other organs look natural.

Microscopical examination of a section of affected lung shows blockage of the bronchioles with débris, pus cells, and desquamated epithelial cells; the submucous coat may be laid bare as though the bronchiole lining had been ulcerated away; the walls of the bronchiole are infiltrated with small round cells, and this small round-celled infiltration extends a small distance beyond the bronchiole itself into the adjacent lung tissue, forming an irregular ring of small round-celled infiltration more or less uniformly all round the bronchiole, without affecting the alveoli in the form of definite broncho-pneumonia. Of course, if sections are cut from areas where there is basal broncho-pneumonia that has developed in a late stage, the microscopical appearances of definite broncho-pneumonia will be found, but a case may die without any such broncho-pneumonia being present at all, and then the feature in the section which attracts attention is the filling of the bronchi with cells, and the ring of small round-celled infiltration all round the bronchiole in the way that is illustrated in Fig. 1, a drawing from a section.

Cyanosis and Respiratory Distress.

One of the most striking features of these cases is the great respiratory distress and the peculiar heliotrope cyanosis of the face in the fatal cases. Even when lying in bed quietly the respiration may be as rapid as that of a lobar pneumonia case; whilst any very slight exertion—such as turning over on to the side—may cause the respiration-rate to rise to 50 per minute or even more. Seeing that there may be little, if any, consolidation of the lung tissue, it would appear that some other factor than diminished serviceable lung tissue is at work to cause this dyspnœa, and one conjectures that this other factor is the effect of toxic substances upon the respiratory centre. It was partly on this account that special bacteriological researches were carried out in a small series of consecutive cases, and the striking result of these investigations is to show that the malady is due to a double infection with the influenza bacillus coupled with the pneumococcus. A summary of the actual findings is given below; the general conclusion which they afford is that, whether the cultures were made from the sputum itself or from material obtained by lung puncture, or from the blood or organs post mortem, these two organisms were constantly found, and the conjecture is that the disease starts as an influenzal infection, terminating in the fatal cases as a pneumococcal septicæmia.

The temperature charts are given below, and they show great variability in the duration of pyrexia, but in all cases the temperature tends to fall by lysis, and though it is not, as a rule, at any stage very high, in the severer cases it inclines to persist for a very long time.

The total number of cases that have come under observation amounts to scores, but owing to the fact that the earlier examples of the malady were often classified as broncho-pneumonia, or pneumonia, and not as purulent bronchitis, it is difficult to give exact figures as to the incidence or the mortality rate. Speaking from impressions and not from actual figures one would estimate the mortality at something like 50 per cent. There is no particular age incidence, and whilst the majority of patients were of inferior physique and many had been sufferers in the past from chronic chest troubles, the disease also occurred in men who had enjoyed robust health in their previous occupations and had never suffered from any lung disease, a circumstance sometimes strikingly borne out in post-mortem examination.

The purpose of the present paper is merely to deal with the bacteriology of the eight consecutive cases that were investigated specially from the bacterial point of view.

Summary of Eight Consecutive Cases.

The following are the summarised clinical notes of these eight cases.

CASE 1.—B., R.E.; age 40; service 17 days. This man had been subject to bronchitis for years, and had an emphysematous chest. He had been ill with cough and some pyrexia for five days previous to his admission on March 12th, 1917. On admission there was much dyspnœa, especially on exertion, accompanied by wheezy respiration; the chest was everywhere resonant, but the vesicular murmur was poor and both lungs were crowded throughout with rhonchi except at the bases, where the rhonchi were replaced by fine non-consonating râles. The sputum was very abundant and purulent. For six days the man was in a critical condition. Treatment was by benzoin inhalations and an expectorant mixture. On March 20th the sputum was still typically of the pale yellow, thick, purulent type, not frothy, and free from obvious odour, amounting to 12 ounces in the 24 hours, but from this date it gradually became more frothy, and simultaneously the lungs slowly cleared. On March 28th, however, the amount of sputum was still as much as 7 ounces in the 24 hours. Convalescence was very much slower in this case than in most of those who recovered. It was not until April 27th that he was deemed fit to be transferred to an

auxiliary military hospital. At this time thick yellow purulent phlegm was still being expectorated in abundance and rhonchi were still audible over both lungs. At the auxiliary military hospital he suffered a relapse, associated with the development of dullness, bronchial breathing, and crackling rales over the lower half of the right lung behind. The bronchial breathing at the right base was very slow to clear up, and there were still abnormal signs at this base on June 16th, 1917. On June 15th the chest was needled, but no fluid was found in the pleural cavity.

The bacteriological findings were as follows. The first examination of the sputum showed the presence of *B. influenzæ*, *Micrococcus catarrhalis*, and a streptococcus; the second examination the presence of *B. influenzæ*, pneumococcus, *Micrococcus catarrhalis*, *Streptococcus longus*, and *B. fusiformis*. (Chart Ia, Ib.)

CHART Ia. (CASE 1.)

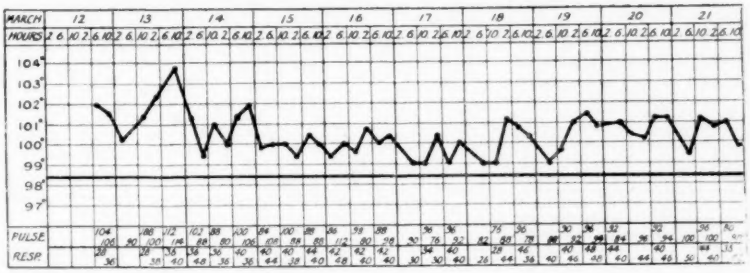
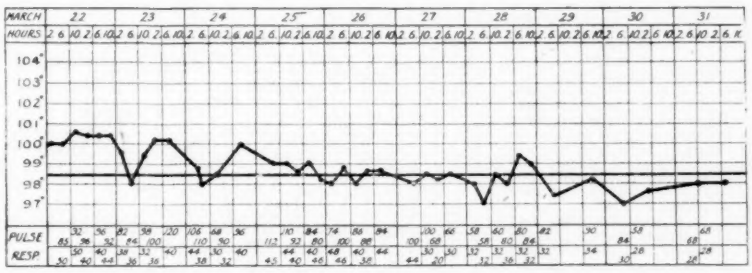


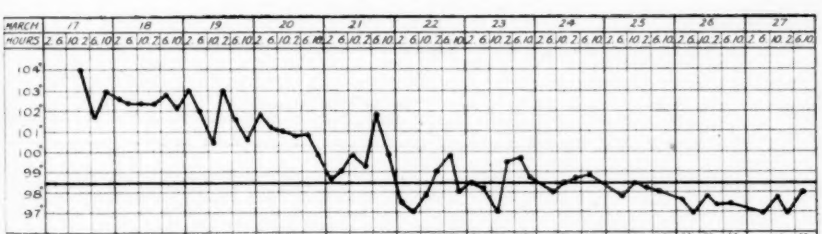
CHART Ib. (CASE 1.)



CASE 2.—D., —— Terr. Reserve Batt.; age 16; service one month. Admitted on March 17th, 1917, having been taken ill the previous day with shivering, cold, and pain in the chest. The temperature was 104° F.; pulse-rate, 118; respiration-rate, 44. The patient was very restless and had much dyspnœa, but was not cyanosed. The anterior aspect of the lungs presented normal signs; posteriorly there were coarse rales, non-consonating in character, at both bases. The sputum was abundant, thick, purulent, airless, for the most part pale yellow, but with here and there a trace of blood. Two days later the patient was very distressed in his breathing, restless, and moderately cyanosed. Rales and rhonchi were present all over both lungs. The amount of sputum in the 24 hours was 15 ounces. He was treated by an antiseptic inhalation and an expectorant mixture, and his condition was so bad at one time that pituitrin injections were resorted to. On March 20th he was better, but the sputum was still very thick and abundant, 10 ounces being coughed up in 24 hours. On March 22nd the sputum in 24 hours did not exceed 5 ounces, and in character it was beginning to be frothy. From this time onwards he recovered rapidly and was discharged to duty on April 19th, 1917.

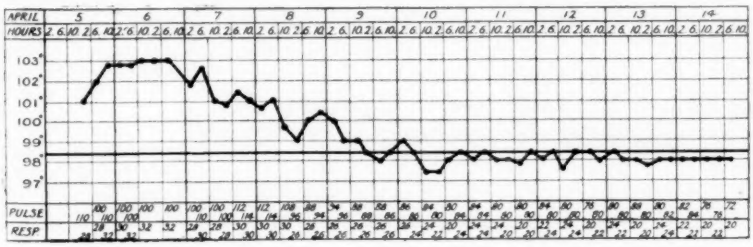
The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and staphylococcus. (Chart II.)

CHART II. (CASE 2.)



CASE 3.—J., 2nd A.M., R.F.C.; age 30; service 14 days. Taken ill three days previous to admission on April 1st, 1917, with symptoms of a cold in the head and a sore throat. He complained of headache and a dry cough without expectoration, shortness of breath, and a pain behind the sternum. No abnormal signs were made out in the chest at this time, but during the next few days both lungs developed numerous rales and rhonchi, and the troublesome cough, which at first had been dry, became associated with abundant expectoration of thick yellow pus. The temperature chart is given below. Treatment consisted in antiseptic inhalations and an expectorant mixture.

CHART III. (CASE 3.)



Purulent sputum, with rhonchi in the chest, persisted until April 23rd, after which convalescence was rapid and the man was transferred to an auxiliary military hospital on April 27th, 1917.

The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. (Chart III.)

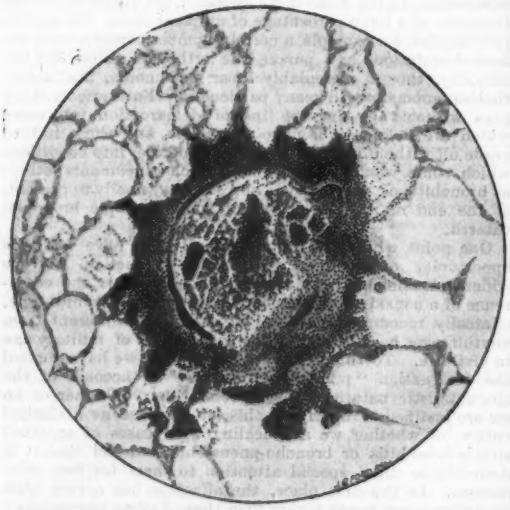
CASE 4.—H., 2nd A.M., R.F.C.; age 35; service four months. Admitted on April 4th, 1917, with a history of having been out of sorts with a cold and bronchial cough for ten days previously. On admission his temperature was 103° F.; pulse-rate, 112; respiration-rate, 36. Abundant blood-stained purulent sputum. The accompanying temperature chart indicates the course of the disease. The man was seriously ill with purulent bronchitis for ten days; improved considerably for a short time; then relapsed for a week, becoming seriously ill again, but ultimately recovering completely. Throughout the whole time he was in hospital he was coughing up abundant thick yellow pus, which, at first blood-stained, was later yellow and free from visible blood. No tubercle bacilli were found. Treatment was mainly by the use of antiseptic inhalations.

The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. (Chart IVa, IVb, IVc.)

CASE 5.—A., 3rd A.M., R.F.C.; age 29; service 14 days. The patient had been ill three days with headache, cough, and generalised pain previous to his admission on April 5th, 1917. The temperature on admission to hospital was 103° F.; pulse-rate, 112; respiration-rate, 20; no abnormal physical signs could be made out in the chest. The temperature fell the next day to 101° and the patient had been sleeping well. A few semi-crepitant rales appeared at the right apex on April 7th, and the temperature again rose to 104°; lobar pneumonia was suspected at this time, but no further signs of consolidation developed, but rhonchi appeared over the whole of both lungs, associated with abundant thick yellow expectoration, and from the character of the sputum and the temperature chart the case was thought to be one of purulent bronchitis. The patient continued to cough up a great deal of sputum until April 11th, when the amount became less, and the temperature fell to 99°. On April 14th there was a patch of bronchial breathing at the left base, and the sputum was slightly rusty. The signs of consolidation or of massive collapse at the left base continued until April 29th, but on May 5th both bases were clear and the condition of the patient seemed to be improving. The cough still continued, but was not so troublesome

amount almost to gasps, reminiscent of the effects of gas-poisoning. Recovery at this stage may occur, but by the time the cyanosis has become at all pronounced the prognosis is extremely bad, though the number of days the patient may still live in spite of the severity of his distress is often surprising. The character of the sputum remains the same throughout, though sometimes it is blood-tinged or actual blood may be expectorated instead of, or in addition to, the more typical pale yellow pus. In the later stages of the illness areas of impaired note or of actual dullness may be found, particularly over the posterior aspects of the lungs, associated with bronchial breathing and crepitant râles. These may be due to the progression of the purulent bronchitis into hypostatic pneumonia, or into actual broncho-pneumonia at the bases; or, on the other hand, they may be due to massive collapse of the lungs secondary to the bronchitis and obstruction of the bronchioles by pus. In a few cases, not necessarily the most serious, a frank lobar pneumonia has developed later, and has been followed by an empyema from which 15–30 ounces of thin pneumococcal pus has been aspirated—in one case alone was resection of a rib unavoidable. The condition, however, is

FIG. 1.



Section of lung tissue, under low power of microscope, showing the alveoli to be hardly affected at all, while the bronchiole is filled with cells and débris, and its wall and the immediately surrounding parts are characteristically infiltrated with small round cells.

not primarily a lobar or a broncho-pneumonia, but a bronchitis, and although a small amount of basal broncho-pneumonia has been present in one or two of our post-mortem examinations, in other fatal cases there has been no broncho-pneumonia at all, not even the smallest portions of either lung being found to sink in water.

We have no doubt that the condition is primarily an affection of the bronchi and bronchioles, and not of the alveoli, though the alveoli may be affected later if the patient survives long enough. In a typical post-mortem examination it would be difficult, or almost impossible, to define the actual cause of death unless one knew the clinical history. The heart is generally dilated moderately as to its right side, but this dilatation is seldom enough to attract a great deal of attention in itself. The lungs may exhibit basal areas of broncho-pneumonia or superficial areas of collapse over the backs of the lower lobes, as described above, or there may be a little dry pleurisy, but in the majority of cases there is no pleurisy, no broncho-pneumonia, no collapse, and at first sight the lungs look perfectly normal. On incising and squeezing a piece of lung, however, the thick yellow pus, sometimes altered to a dirty grey colour as the result of the post-mortem changes, can be seen bubbling out of nearly all the bronchioles. All the other organs look natural.

Microscopical examination of a section of affected lung shows blockage of the bronchioles with débris, pus cells, and desquamated epithelial cells; the submucous coat may be laid bare as though the bronchiole lining had been ulcerated away; the walls of the bronchiole are infiltrated with small round cells, and this small round-celled infiltration extends a small distance beyond the bronchiole itself into the adjacent lung tissue, forming an irregular ring of small round-celled infiltration more or less uniformly all round the bronchiole, without affecting the alveoli in the form of definite broncho-pneumonia. Of course, if sections are cut from areas where there is basal broncho-pneumonia that has developed in a late stage, the microscopical appearances of definite broncho-pneumonia will be found, but a case may die without any such broncho-pneumonia being present at all, and then the feature in the section which attracts attention is the filling of the bronchi with cells, and the ring of small round-celled infiltration all round the bronchiole in the way that is illustrated in Fig. 1, a drawing from a section.

Cyanosis and Respiratory Distress.

One of the most striking features of these cases is the great respiratory distress and the peculiar heliotrope cyanosis of the face in the fatal cases. Even when lying in bed quietly the respiration may be as rapid as that of a lobar pneumonia case; whilst any very slight exertion—such as turning over on to the side—may cause the respiration-rate to rise to 50 per minute or even more. Seeing that there may be little, if any, consolidation of the lung tissue, it would appear that some other factor than diminished serviceable lung tissue is at work to cause this dyspnœa, and one conjectures that this other factor is the effect of toxic substances upon the respiratory centre. It was partly on this account that special bacteriological researches were carried out in a small series of consecutive cases, and the striking result of these investigations is to show that the malady is due to a double infection with the influenza bacillus coupled with the pneumococcus. A summary of the actual findings is given below; the general conclusion which they afford is that, whether the cultures were made from the sputum itself or from material obtained by lung puncture, or from the blood or organs post mortem, these two organisms were constantly found, and the conjecture is that the disease starts as an influenzal infection, terminating in the fatal cases as a pneumococcal septicæmia.

The temperature charts are given below, and they show great variability in the duration of pyrexia, but in all cases the temperature tends to fall by lysis, and though it is not, as a rule, at any stage very high, in the severer cases it inclines to persist for a very long time.

The total number of cases that have come under observation amounts to scores, but owing to the fact that the earlier examples of the malady were often classified as broncho-pneumonia, or pneumonia, and not as purulent bronchitis, it is difficult to give exact figures as to the incidence or the mortality rate. Speaking from impressions and not from actual figures one would estimate the mortality at something like 50 per cent. There is no particular age incidence, and whilst the majority of patients were of inferior physique and many had been sufferers in the past from chronic chest troubles, the disease also occurred in men who had enjoyed robust health in their previous occupations and had never suffered from any lung disease, a circumstance sometimes strikingly borne out in post-mortem examination.

The purpose of the present paper is merely to deal with the bacteriology of the eight consecutive cases that were investigated specially from the bacterial point of view.

Summary of Eight Consecutive Cases.

The following are the summarised clinical notes of these eight cases.

CASE 1.—B., R.E.; age 40; service 17 days. This man had been subject to bronchitis for years, and had an emphysematous chest. He had been ill with cough and some pyrexia for five days previous to his admission on March 12th, 1917. On admission there was much dyspnœa, especially on exertion, accompanied by wheezy respiration; the chest was everywhere resonant, but the vesicular murmur was poor and both lungs were crowded throughout with rhonchi except at the bases, where the rhonchi were replaced by fine non-consonating râles. The sputum was very abundant and purulent. For six days the man was in a critical condition. Treatment was by benzoin inhalations and an expectorant mixture. On March 20th the sputum was still typically of the pale yellow, thick, purulent type, not frothy, and free from obvious odour, amounting to 12 ounces in the 24 hours, but from this date it gradually became more frothy, and simultaneously the lungs slowly cleared. On March 23th, however, the amount of sputum was still as much as 7 ounces in the 24 hours. Convalescence was very much slower in this case than in most of those who recovered. It was not until April 27th that he was deemed fit to be transferred to an

auxiliary military hospital. At this time thick yellow purulent phlegm was still being expectorated in abundance and rhonchi were still audible over both lungs. At the auxiliary military hospital he suffered a relapse, associated with the development of dullness, bronchial breathing, and crackling râles over the lower half of the right lung behind. The bronchial breathing at the right base was very slow to clear up, and there were still abnormal signs at this base on June 16th, 1917. On June 15th the chest was needled, but no fluid was found in the pleural cavity.

The bacteriological findings were as follows. The first examination of the sputum showed the presence of *B. influenzæ*, *Micrococcus catarrhalis*, and a streptococcus; the second examination the presence of *B. influenzæ*, pneumococcus, *Micrococcus catarrhalis*, *Streptococcus longus*, and *B. fusiformis*. (Chart IA, IB.)

CHART IA. (CASE 1.)

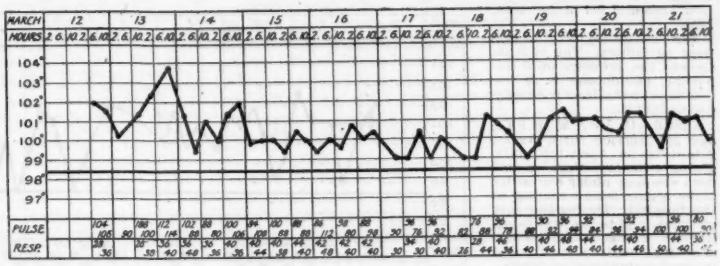
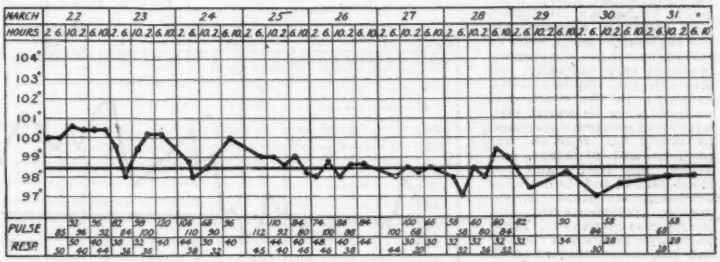


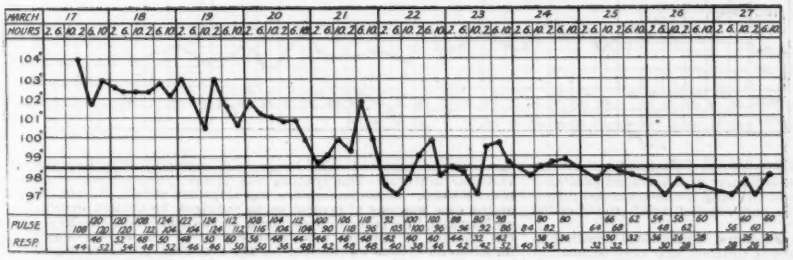
CHART IB. (CASE 1.)



CASE 2.—D., —— Terr. Reserve Batt.; age 16; service one month. Admitted on March 17th, 1917, having been taken ill the previous day with shivering, cold, and pain in the chest. The temperature was 104° F.; pulse-rate, 118; respiration-rate, 44. The patient was very restless and had much dyspnœa, but was not cyanosed. The anterior aspect of the lungs presented normal signs; posteriorly there were coarse râles, non-consonating in character, at both bases. The sputum was abundant, thick, purulent, airless, for the most part pale yellow, but with here and there a trace of blood. Two days later the patient was very distressed in his breathing, restless, and moderately cyanosed. Râles and rhonchi were present all over both lungs. The amount of sputum in the 24 hours was 15 ounces. He was treated by an antiseptic inhalation and an expectorant mixture, and his condition was so bad at one time that pituitrin injections were resorted to. On March 20th he was better, but the sputum was still very thick and abundant, 10 ounces being coughed up in 24 hours. On March 22nd the sputum in 24 hours did not exceed 5 ounces, and in character it was beginning to be frothy. From this time onwards he recovered rapidly and was discharged to duty on April 19th, 1917.

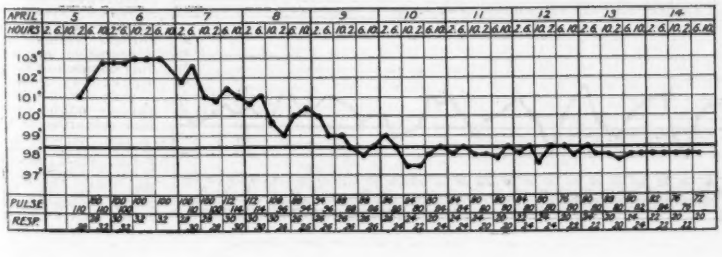
The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and staphylococcus. (Chart II.)

CHART II. (CASE 2.)



CASE 3.—J., 2nd A.M., R.F.C.; age 30; service 14 days. Taken ill three days previous to admission on April 1st, 1917, with symptoms of a cold in the head and a sore-throat. He complained of headache and a dry cough without expectoration, shortness of breath, and a pain behind the sternum. No abnormal signs were made out in the chest at this time, but during the next few days both lungs developed numerous râles and rhonchi, and the troublesome cough, which at first had been dry, became associated with abundant expectoration of thick yellow pus. The temperature chart is given below. Treatment consisted in antiseptic inhalations and an expectorant mixture.

CHART III. (CASE 3.)



Purulent sputum, with rhonchi in the chest, persisted until April 23rd, after which convalescence was rapid and the man was transferred to an auxiliary military hospital on April 27th, 1917.

The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. (Chart III.)

CASE 4.—H., 2nd A.M., R.F.C.; age 35; service four months. Admitted on April 4th, 1917, with a history of having been out of sorts with a cold and bronchial cough for ten days previously. On admission his temperature was 103° F.; pulse-rate, 112; respiration-rate, 36. Abundant blood-stained purulent sputum. The accompanying temperature chart indicates the course of the disease. The man was seriously ill with purulent bronchitis for ten days; improved considerably for a short time; then relapsed for a week, becoming seriously ill again, but ultimately recovering completely. Throughout the whole time he was in hospital he was coughing up abundant thick yellow pus, which, at first blood-stained, was later yellow and free from visible blood. No tubercle bacilli were found. Treatment was mainly by the use of antiseptic inhalations.

The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. (Chart IVA, IVB. IVC.)

CASE 5.—A., 3rd A.M., R.F.C.; age 29; service 14 days. The patient had been ill three days with headache, cough, and generalised pain previous to his admission on April 5th, 1917. The temperature on admission to hospital was 103° F.; pulse-rate, 112; respiration-rate, 20; no abnormal physical signs could be made out in the chest. The temperature fell the next day to 101° and the patient had been sleeping well. A few semi-crepitant râles appeared at the right apex on April 7th, and the temperature again rose to 104°; lobar pneumonia was suspected at this time, but no further signs of consolidation developed, but rhonchi appeared over the whole of both lungs, associated with abundant thick yellow expectoration, and from the character of the sputum and the temperature chart the case was thought to be one of purulent bronchitis. The patient continued to cough up a great deal of sputum until April 11th, when the amount became less, and the temperature fell to 99°. On April 14th there was a patch of bronchial breathing at the left base, and the sputum was slightly rusty. The signs of consolidation or of massive collapse at the left base continued until April 29th, but on May 5th both bases were clear and the condition of the patient seemed to be improving. The cough still continued, but was not so troublesome

and the patient seemed better in himself and was gaining weight. He was discharged from hospital on June 19th, 1917.

The bacteriological findings were as follows. The sputum showed the presence of *B. influenzæ*, pneumococcus, *Micrococcus catarrhalis*, and *Streptococcus longus*.

CASE 6.—C., 3rd A.M., R.F.C.; age 26; service three weeks. Admitted on April 5th, 1917, giving a history that he had been sleeping under canvas for three nights before coming to the hospital. During the first of these nights he was taken ill with a cold which became associated with a cough and increasing shortness of breath. On admission there was slight cyanosis, and dyspnœa was very pronounced. Shortly afterwards he became orthopnœic with heliotrope cyanosis. On the slightest exertion, such as turning over in bed, the cyanosis increased very markedly, and although the respiration-rate, as shown in the chart, was under 40 when he was at rest, on the least exertion it increased to nearly 60. Sputum was purulent and abundant, pale yellow, not frothy and not blood-stained, and the day after admission contained *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. There were large numbers of rhonchi and non-consonating râles all over both lungs, but no dullness and no evidence of consolidation. The general condition became worse; the patient slept very badly and shortness of breath became very troublesome. The sputum increased in quantity but always with the same characters as on admission. In spite of strychnine, digitone, brandy, and other stimulants the condition became steadily worse; by April 17th he was very cyanosed and so weak that he could cough nothing up, and he died at 4 A.M. on April 18th, 1917. (Chart V.)

Post-mortem examination.—The lungs were over-distended and nowhere exhibited any consolidation. There was no pleurisy. On squeezing the cut lung dirty grey bubbly pus exuded from all the bronchioles. The heart was moderately dilated as to the right side, but the dilatation was not so great as to attract marked attention. All the other organs were examined in the ordinary way, but none exhibited any special abnormality. Sections of the lung tissue examined microscopically showed bronchiolitis with peribronchial small round-celled infiltration, as depicted in Fig. 1.

The bacteriological findings were as follows. Heart blood smeared in a thin layer over the surface of a tube of nutrient agar after incubation showed the presence of 40 small discrete colonies, 15 of which were composed of pneumococci and 25 of *B. influenzæ*. The spleen gave a mixed growth of pneumococcus and *B. influenzæ*. The lungs gave a mixed growth of pneumococcus, *B. influenzæ*, and *Micrococcus catarrhalis*.

CASE 7.—L., 2nd A.M., R.F.C.; age 19; service three weeks. Admitted on May 12th, 1917, having been ill for seven days previously with cough and pyrexia. On admission his temperature was 105° F.; pulse-rate, 116; respiration-rate, 24. He had a pall[1-2], livid look and was very dyspnœic on the slightest exertion. There were fine crepitations at the bases of both lungs; no dullness; elsewhere normal vesicular murmur. The sputum was yellow, purulent, not rusty or blood stained. Lobar pneumonia was suspected at first, but the course of the case was one of typical acute purulent bronchitis, developing on May 21st into broncho-pneumonia at the left base. On May 17th the amount of sputum was 10 ounces in 24 hours. On May 21st impairment of note was noticed for the first time at the left base with bronchial breathing and ægophony. On May 25th the left base was explored; no fluid was found. A little blood obtained in the syringe was cultivated and yielded a pure growth of *Bacillus influenzæ*. On May 30th the sputum was still abundant and purulent. On June 6th the patient was much better and the signs of consolidation at the left base were clearing up. This case appears to have been an example of what for the first nine days was purulent bronchitis and then passed on into a condition of basal broncho-pneumonia.

The bacteriological findings were as follows. The first examination of the sputum showed the presence of *B. influenzæ*, pneumococcus, and yeast cells. The second examination showed almost pure *B. influenzæ* and a few pneumococci. A third examination showed *B. influenzæ*, pneumococcus, and *Micrococcus catarrhalis*. Examination of the fluid obtained by lung puncture showed *B. influenzæ*, *Staphylococcus albus*, and *B. xerosis*. (Chart VI.)

CASE 8.—D., 3rd A.M., R.F.C.; age 32; service 16 days. Admitted on May 15th, 1917. He gave a history of having had a cough

CHART IVA. (CASE 4.)

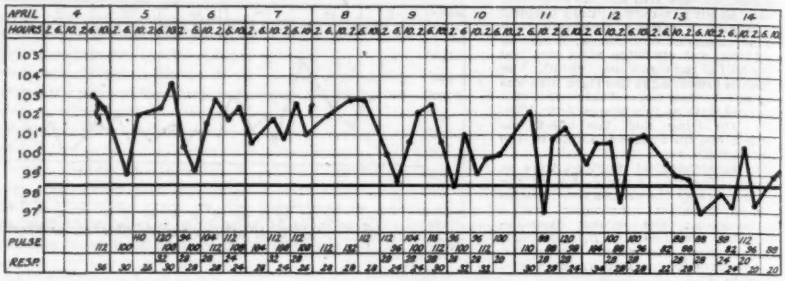


CHART IVB. (CASE 4.)

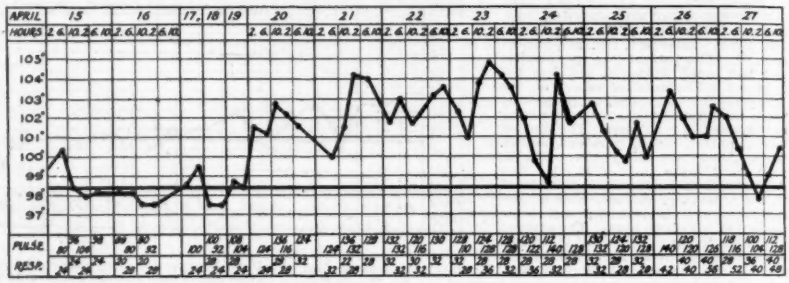


CHART IVC. (CASE 4.)

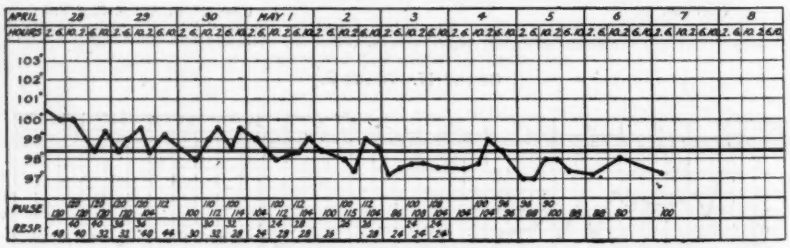
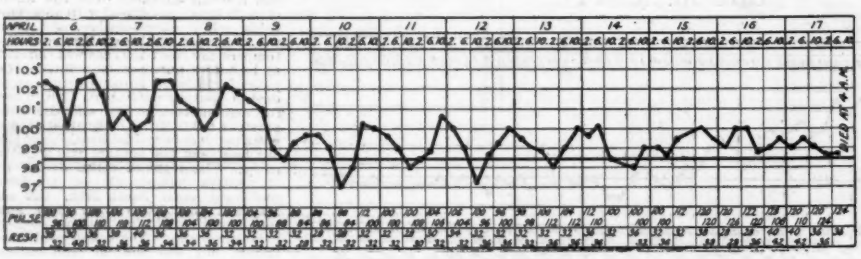


CHART V. (CASE 6.)



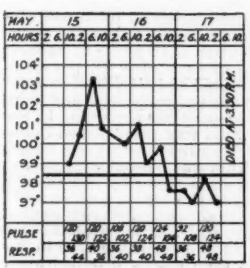
for eight days previously to admission; this cough had not incapacitated him much at first, but he became progressively more ill during the four days before his admission to hospital, with increasing shortness of breath and abundant yellow sputum, which he found it difficult to raise. On admission dyspnœa with cyanosis was very evident, the vesicular murmur was very poor all over both sides of the chest with difficult expiration, some wheezy noises over the front of the chest, and fine crepitations at the bases. On the whole, however, physical signs were remarkably inconspicuous. Next day he was less well, with much dyspnœa, especially on the slightest exertion, increasing cyanosis, a gasping type of breathing, and general distress. He was only able to sleep in snatches; the pulse, at first good, became feeble; the respiration-rate, even when he was at rest, was nearer 50 than 40. In spite of treatment by venesection, injections of camphor in olive oil, pituitrin, strychnine, and the use of a steam tent and an expectorant mixture, he rapidly went downhill and died at 3.30 P.M. on May 17th, 1917. (Chart VII.)

Post-mortem examination.—There were old filamentous pleuritic adhesions all over the right lung. The bronchial glands were swollen and red, probably as the result of absorption into them of the organisms infecting the lung; there was no laryngitis, but there was deep reddening of the mucous membrane of the trachea and of the main bronchi. The bronchioles were full of thick, yellowish-green pus, but there was no consolidation in either lung—not even basal broncho-pneumonia. The right side of the heart was not markedly dilated. The spleen was not enlarged. All the other organs looked normal, except that there was cyanosis of the mucous membrane of the stomach and of the pyramids of the kidneys.

Microscopical sections showed typical inflammation of the bronchioles, with small round-celled infiltration of the peribronchial tissue, similar to that illustrated above, without any broncho-pneumonia.

The bacteriological findings were as follows. The heart blood gave a mixed growth of pneumococcus, *B. influenzæ*, and *Micrococcus catarrhalis*. The lung gave a mixed growth of pneumococcus, *B. influenzæ*, *Streptococcus longus*, and a Gram-positive bacillus of the *mesentericus* group.

CHART VII. (CASE 8).



Bacteriological Summary.

The following is a summary of the bacteriological findings in the above cases, which may be classified clinically as follows:—3 mild cases; 1 severe but not fatal; 2 fatal cases. Two cases were only examined bacteriologically whilst convalescing.

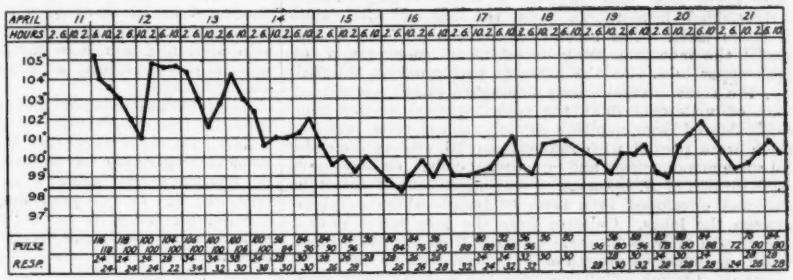
Sputum.

Microscopical. — Film preparations stained by various methods showed pus cells held together in dense masses by fibrin, together with epithelial cells and numerous bacteria. No blood cells could be detected. The bacteria, although numerous, were in some instances limited apparently to two species—namely, (*a*) minute Gram-negative bacilli often exhibiting bipolar staining and so simulating diplococci, chiefly intracellular but also in extracellular bunches; and (*b*) extracellular Gram-positive lanceolate diplococci. Although the bacteriological flora was often very varied as to morphology and staining reactions, in every instance the Gram-negative bacillus predominated. No tubercle bacilli were encountered in any of the specimens.

Cultural.—Cultivations were established in every case upon blood agar, and in 7 of the 8 resulted in a copious growth of *B. influenzæ*, associated with *Streptococcus lanceolatus* (pneumococcus). The exception was a convalescent case whose sputum was overlooked, and culture-tubes were not planted until four days after collection; although intracellular Gram-negative bacilli were observed in profusion in the films of the sputum, the only organism that developed in culture was *Staphylococcus albus*. In different cases one or other species of the *Micrococcus catarrhalis* group was met with, also *Micrococcus pyogenes aureus*, *Micrococcus pyogenes albus*, *Streptococcus pyogenes longus*, *Streptococcus brevis*, and *Micrococcus tetragenus*. The only two organisms common to the entire series, however, were *B. influenzæ* and *Streptococcus lanceolatus* (pneumococcus). A strain of each of these organisms was isolated from each of seven cases and the various characters compared.

Bacillus influenzæ.—All the strains corresponded in early culture (24 hours) on blood agar, in presenting minute translucent colonies, not exceeding 1 mm. in diameter and at no period exceeding 2 mm., hemispherical, with entire edge, moist. Later the colonies tended to become greyish, and after frequent subcultures upon this medium exhibited a tendency to coalesce and form a moist film. Microscopically the individual bacilli were small in size and arranged singly

CHART VI. (CASE 7.)



and in pairs; occasionally thread forms were noted. Sub-cultures upon inspissated blood serum, agar, broth, &c., failed to develop.

Streptococcus lanceolatus (pneumococcus).—All the strains isolated were identical and typical in all cultural characters.

Inoculations.

Three of the samples of sputum—two from mild cases and one from a patient who subsequently died—were injected directly into rabbits, into the subcutaneous tissue of the anterior abdominal wall. Beyond swelling and œdema at the site of inoculation, the animals appeared in fair health for a few days, but on the fifth day after inoculation, in the case of the rabbit injected with the sputum from the severe case, and the sixth day in the two remaining rabbits, the animals were moribund and consequently destroyed and autopsies carried out. The results in each case were identical.

1. The *local lesion* in each case on section presented the appearances described by Eyre, Leatham, and Washbourn,[1] as produced by the pneumococcus of the "cellular" type, and microscopically consisted of small-celled infiltration with a minimum of fibrin and enormous numbers of pneumococci; in one of the local lesions a few Gram-negative bacilli were also found after prolonged search. Cultures in each instance gave a mixed growth of pneumococcus and *B. influenzæ*.

2. *Heart blood.*—This contained numerous pneumococci and cultures gave a pure growth of pneumococci.

3. *Spleen pulp.*—This showed pneumococci, and in one some bunches of minute Gram-negative bacilli. Cultures gave a mixed growth of pneumococcus and *B. influenzæ*.

The pneumococcus isolated from the heart blood of one of these rabbits was tested and found to possess standard virulence—viz., minimal fatal dose = 0·000001 loop.

Virulence Determinations.

(*a*) *Pneumococci.*—An attempt was made to estimate the virulence of the strains of pneumococci isolated from the original sputa from three of the cases (from two mild and one severe, subsequently fatal case) by the method described by Eyre and Washbourn. In each of these three strains the virulence was found to be exceedingly low, a dose of many loopfuls being needed to kill a mouse, as compared with standard virulence of 0·000001 loop. The various strains of pneumococci present in the original sputa must therefore be regarded as of exceedingly low virulence, but capable of readily acquiring a high degree of virulence, as evidenced by the standard virulence of a strain after passage through one rabbit only (see inoculation of sputum above).

[1] Local Lesions Produced by the Pneumococcus, Journal of Pathology and Bacteriology, 1906, ii., 246-269.

(*b*) *B. influenzæ*.—As the *B. influenzæ* is usually regarded as without lethal effect upon the lower animals, except when introduced directly into the brain tissue, no virulence estimations were attempted. Inoculations were, however, made with strains of *B. influenzæ* isolated from two of the "mild" cases. Two small rabbits of 500 grammes each were subjected to intrapulmonary inoculations—about three loopfuls of a 24-hours old blood-agar culture emulsified in 0·1 c.c. sterile saline solution being injected into the lung tissue by means of a hypodermic syringe provided with fine needle, which was plunged through the chest wall directly into the substance of the lung. One experiment was a complete failure, as the needle passed through the right lower lobe and injured a large vessel, causing a right-sided hæmothorax, and the animal died some 12 hours later. The second inoculation was more successful, the inoculum being deposited in the centre of the right upper lobe. At the autopsy, performed on the fifth day, the right pleural cavity contained rather more than 2 c.c. of opalescent fluid, the centrifugalised deposit from which showed large numbers of polynuclear cells, many of which were packed with influenza bacilli, eosinophile cells, and some mononuclears and endothelial cells. Cultures gave a rich growth of *B. influenzæ*. The upper lobe of the right lung was enveloped in a layer of lymph which extended between the lobes. Cultures from the lung tissue gave a pure growth of *B. influenzæ*. Cultures from the heart blood yielded a luxurious growth of *B. influenzæ* which contained many thread forms. Cultures from the spleen gave a good growth of *B. influenzæ*, the individual bacilli in which were fairly uniform in length. It was intended to test further the pathogenetic activities of *B. influenzæ*, but during the absence of one of us from the laboratory owing to illness the various strains died out, and this portion of the investigation had perforce to be abandoned.

General Bacteriological Conclusions.

It seems not unlikely that these patients suffer from a primary invasion of their lung tissues by the *B. influenzæ*, and that pneumococci, present at the same time, are at first of low virulence. The earlier symptoms seem to be attributable to a *B. influenzæ* toxæmia. Exaltation of the virulence of the pneumococci by symbiotic growth with *B. influenzæ* would appear to follow, a fatal termination being due to pneumococcal septicæmia.

Mortality.

Although the above eight cases constitute but a small portion of the total number that have been in the hospital altogether, they were consecutive cases, not selected in any way, and they show a mortality of 25 per cent., sufficiently indicating the seriousness of the disease. When a patient has become decidedly cyanosed no treatment that we have been able to devise appears to do any good. Loss of men from the malady is likely to be prevented not so much by means of treatment when the disease is well established as by getting the men into hospital early when they are in a condition of what in civil practice would be regarded perhaps as a quite trivial bronchial catarrh. Seeing that a large percentage of our cases came from one unit—6 out of 8 in the above series, although the Connaught Hospital admits patients without selection from almost every unit in the command—and seeing that the bacterial infection appears to be primarily an influenzal one, another line of treatment which suggests itself is isolation of the cases and disinfection in the hope of preventing the spread by contact of this serious form of influenzal infection, and thus consequent loss of life. We could emphasise again that although we have dealt with only eight cases in detail we have had a much larger number altogether, and we have heard that the malady has been by no means confined to our command.

Our best thanks are due to Lieutenant-Colonel William Turner, C.M.G., officer commanding the Connaught Hospital, for permission to publish these cases.

Note.—Since the above article was completed a more thorough and elaborate publication on the subject has appeared in THE LANCET of July 14th, 1917, p. 41, in which Hammond, Rolland, and Shore, in the investigation of cases occurring among troops in France, have recorded conclusions almost identical with ours. It is probable that the disease in question is more widespread than has hitherto been recognised. We have, however, published our own results, if only to confirm the findings of Hammond, Rolland, and Shore (*vide* THE LANCET, July 21st, p. 98).

TRENCH FEVER, OR P.U.O., ASSOCIATED WITH THE PRESENCE OF A HÆMOGREGARINE.

BY LYN DIMOND, M.B., CH.B. MANCH.,
CAPTAIN, R.A.M.C.; BACTERIOLOGIST, MILITARY HOSPITAL, HAMPSTEAD.

THE presence of a small hæmogregarine resembling in many respects the *Hæmogregarina gracilis* found by Wenyon[1] in a lizard host, *Mabuia quinquetæniata*, has been noted in the venous blood, the blood from liver, spleen, and lung punctures in 12 cases of P.U.O. or trench fever. As a prolonged investigation of the capillary blood by means of thin films and the Ross thick-film method failed to give uniform positive results, an examination of the venous blood was undertaken.

An enormous number of films were examined, and at frequent intervals forms were discovered which by their shape and staining reactions suggested the possibility that they might be hæmogregarines. As these bodies were obviously present in small numbers, even when the blood was examined upon the day or two preceding the febrile stages of the disease, the following technique was adopted in order to obtain the necessary number for purposes of diagnosis and observation.

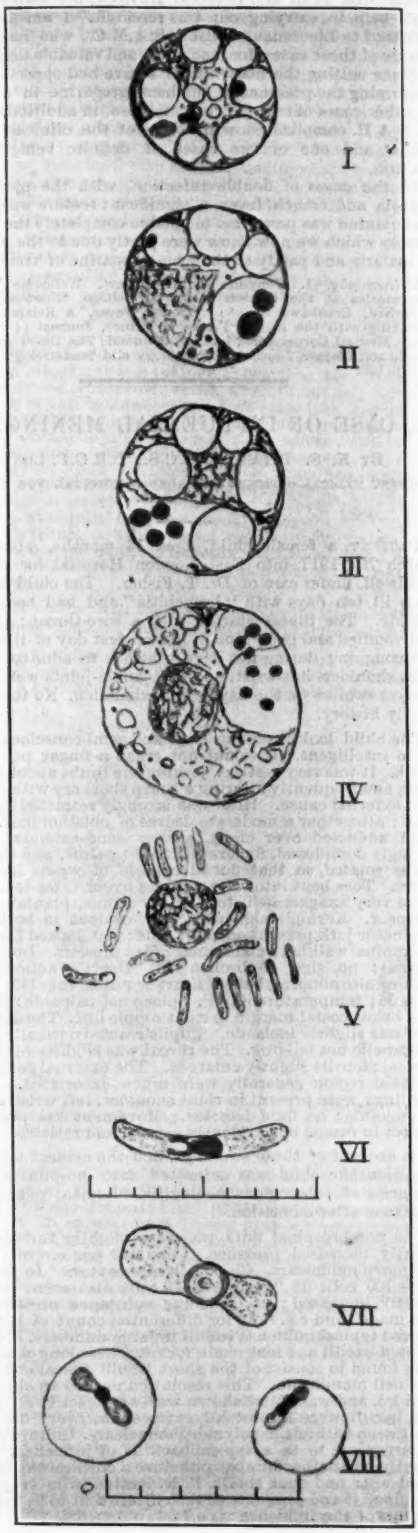
Technique.—The specimens of blood from the cases of trench fever, which included 8 of McNee, Renshaw, and Brunt's[2] Class A and 4 of their Class B, or periodically relapsing type, were invariably examined, together with the blood of controls in whose case trench fever and even the contact with lice could be excluded. Thirteen such control cases have been so examined. The distilled water used was invariably filtered through porcelain, and all the glass apparatus and slides were specially well cleaned, sterilised, and the latter kept in absolute alcohol and flamed before use in order to exclude extraneous organisms such as yeasts, &c. All blood films, however prepared, were immediately covered with glass shades in order to avoid the possibility of any organisms gaining access thereto from the air.

Two c.c. of the venous blood was obtained by means of a 2 or 5 c.c. syringe from the median basilic vein and at once syringed into a sterile filtered solution of 1·8 per cent. sodium citrate. To this was added 2, 3, or 4 c.c. of a 0·5 per cent. solution of saponin previously filtered and sterilised in order to cause complete hæmolysis of the red corpuscles and more or less complete cytolysis of the leucocytes according to the amount added. The clear red fluid was then placed in the boats of a centrifuge and centrifugalised for 1½ to 2 hours, when all the supernatant clear fluid was poured off and the deposit spread on clean flamed glass slides by means of a sterile pipette and allowed to dry in the air.

An unstained preparation was in addition always mounted in the following way. A thin circle of sterile paroleine was traced out on a slide and a drop of the deposit placed in the centre of a coverslip which was then gently dropped upon the paroleine. By this means a specimen was obtained in which the movements of the organism could be observed for considerable periods of time, as the thin layer of paroleine surrounding the drop of the deposit prevents evaporation which rapidly takes place when the ordinary fresh preparation is being examined on the warm stage. During the periods just preceding pyrexia when the protozoa are most numerous, the following modification is used. Three or four c.c. of the suspension of the 2 c.c. of blood in sodium citrate solution are added to 12 to 15 c.c. of the sterile, filtered distilled water. The water completely hæmolyses the red corpuscles, but has the advantage that apart from causing swelling up of the leucocytes, it leaves them more or less intact and so allows observation to be made as to the presence or not of parasites within the leucocyte cytoplasm.

The movements of the stained parasites, &c., can be followed on the warm stage by the azur I-saline-paroleine method and of the unstained parasite thrown into relief against a red background by the trypan-red-saline-paroleine method described in "The Blood Platelets in Health and Disease."[3] In the case of trypan-red in certain dilutions there appears to be a definite slowing and cessation of the characteristic movements of the parasite, as is also the case when trypan-blue and trypa-flavine are used. Clinically these dyes are being tried, and already the intravenous exhibition of the latter has given good results.

In addition to the above technique, diagnosis has been confirmed by prolonged study of ordinary thick and thin films of the venous blood.



Diagrams Showing a Few of the Types of the Protozoon of Trench Fever seen in Venous Blood and the Blood and Cells from Spleen and Liver Punctures.

In order to study the cycle of development of the organism the blood and cells from liver, spleen, and lung punctures have been examined. At Lieutenant R. M. Wilson's suggestion the cerebro-spinal fluid from six of the cases was centrifugalised and the deposit examined. The intrathecal pressure of the fluid varied from 10–20 mm. of mercury; the number of cells present varied from one to five or six in 4 c.c., and were invariably lymphocytes. No signs of any hæmogregarines were noted, but the relief of the "shin pain," the hyperalgesia of the skin of middle third of front of legs, the pains in right shoulder, and spleen pains, &c., was so marked, while there was no tendency whatsoever for the pain to return when from 10–12 c.c. of the fluid were withdrawn, that it is now adopted as a routine method of treatment in such cases of severe pain when other simpler measures have failed to afford relief.

One precaution has to be observed in the after-treatment of lumbar puncture when the amount of fluid and its pressure are normal—viz., to keep the patient in bed, the foot-end of which has been raised 8–10 inches, for at least 36–48 hours in order to avoid the typical lumbar puncture headache which usually follows if the patient is allowed to sit up too soon after the operation. This period of rest can be reduced to 6–10 hours if the 10–12 c.c. of cerebro-spinal fluid removed is at once replaced by a similar volume of sterile normal saline.

As the inguinal lymphatic glands were noted to be enlarged and somewhat shotty in certain cases the blood from gland puncture in several of the patients was examined, and in one or two the presence of the hæmogregarine was detected with difficulty and after prolonged examination of thin and thick films. (Major W. Byam informs me that this shotty condition of the inguinal glands is common in the soldier, and that such enlargement cannot be associated with trench fever. In some of the cases, however, axillary and cervical glands were somewhat hard and shotty, and in these specific disease could apparently be excluded.)

The difficulty of finding the protozoon in the lymphatic glands suggests that such are not their habitat as is the liver, and to a less extent the spleen and lung and probably the bone marrow. The examination of the blood withdrawn from the periosteal thickenings of the tibia in certain of the cases is being followed up, but with indefinite results up to the present. The blood films were stained by one or other of the following methods: Giemsa's, Leishman's, or Wright's, and in certain cases Heidenheim's iron-hæmatoxylin method.

A rapid staining method has also been used with excellent results—viz., 0·228 gramme of eosin azur ground up and dissolved in 50 c.c. of pure methyl alcohol. This is allowed to stand for 10–12 days, and the supernatant fluid centrifugalised and used to fix and stain the films. After three minutes' action of the stain it is rapidly washed away by quickly drawing the slide through distilled water once or twice, and then quickly and vigorously shaking dry in order to avoid prolonged action of the water which removes the blue from the structures stained therewith.

Short Description of Protozoon.

The two more common types of the hæmogregarine encountered in the venous blood a day or two before the onset of pyrexia are (1) macromerozoites, 7–13 μ long (these are generally free in the plasma), and (2) micromerozoites, 3–4 μ long, more commonly encysted, and in the red corpuscles, but may be free. In addition to the micromerozoites, &c., which are slender, not more than 1 μ wide at the most, there are other free or encysted "sausage-shaped" forms 4–6 μ long by 3–4 μ wide. Within their transparent cyst the blue-stained cytoplasm stands out clearly, and the deep-red-stained nucleus consists of small pyriform masses of chromatin

DESCRIPTION OF ILLUSTRATIVE PLATE.

I. to V.—A few of the stages of the development of the parthenogenetic gametocyte in the venous blood, liver, and spleen, showing division of the nucleus with its dense chromatin into ultimately 20 merozoites. The blue-stained, coarsely reticular, cytoplasm and the nucleus *de reliquat* are very distinct in all the stages figured. The merozoites at sporulation are drawn double the actual size (Fig. V.) (Stained by Wright's method.)

VI.—Fully developed merozoite. (Stained by Wright's method.)

VII.—Female gametocyte. (Stained by Wright's method.)

VIII.—Encapsulated micromerozoites within the red corpuscles. (Stained by eosin-azur II method; see text.)

N.B.—The upper scale of microns applies to Figs. I.–VI., the lower scale to Figs. VII. and VIII. only.

so arranged as to give it a rosette appearance. Other types of "sausage" bodies are encountered in the blood of these cases similar in size to the preceding, but whose round or oval nucleus consists of a thin red-stained circumference with a single deep-red chromosome at its centre. One or other or all of these types of merozoite may be present according to the stage of the disease in relation to the pyrexia, being most numerous just preceding the febrile stage. They gradually increase in number up to the height of fever, when they disappear, and the day after the pyrexia none of these forms can be found in the blood, the only form of parasite then present being the parthenogenetic gametocyte. This gametocyte can be found in different stages of development according to the time elapsed subsequent to the pyrexial stage, and ultimately just before the rise of temperature gives rise to 20 merozoites.

A rough diagram of the cycle of development of this parthenogenetic origin of the merozoites is appended, as during the latent stages of trench fever a diagnosis can be made with absolute certainty by finding any of these characteristic bodies in the venous blood, spleen, or liver. Personally I have found spleen puncture the quickest way to establish the diagnosis of trench fever.

In brief, this gametocyte of the hæmogregarine of trench fever is a round, oval, or bluntly triangular body in shape, which in the first stages of development is 4–6 μ long by 3–5 μ wide. The cytoplasm is stained an intense blue, and is coarsely reticular in specimens stained by Giemsa's method. There is a large, diffuse, purple nucleus *de reliquat*, and at the periphery of the cell there is a dense, deep-red-stained nucleus rich in chromatin. This is usually situated at an opposite pole to the nucleus *de reliquat*, and in the first stages of development it is round, later oval, and then rod-shaped. As development continues this nucleus divides into two, then four, eight, until when 20 nuclei are formed sporulation commences with the setting free of 20 small merozoites. These merozoites at the moment of sporulation are generally 0·75–1·2 μ long, and gradually become larger until the mid-stages of pyrexia, when they disappear from the venous blood. In distinction from the gametocyte of latent malaria (*H. vivax* infection) this gametocyte of trench fever possesses no pigment or hæmozoin. The size of the gametocyte at the moment of sporulation is 13–15 μ. In addition to this form of development of the merozoites, the micromerozoites develop by a process of schizogony, the schizont when first noted in the liver or blood being an oval purple-stained body 5·5 μ long by 4·5 μ broad, the periphery of which is crenated and just within which crenations is a row of small nuclei which completely encircle the schizont.

There is also evidence that the merozoites develop asexually with the production of a second type of schizont in the liver. In the liver and occasionally in the venous blood what are apparently the gametocytes, or sexual forms, are to be noted. The female gametocyte consists of a circular dense ring-shaped nucleus with a central chromosome. On either side of the nucleus are two semicircular uniform masses of cytoplasm, one of greater transverse diameter than the other. The measurements of a typical example are: length 5μ, width of wider cytoplasmic mass 3·4μ, of the smaller 2·2μ, and the diameter of the nucleus 1·7μ. The male gametocyte is a round or egg-shaped body 3–3·5μ in diameter with a centrally situated nucleus usually with three chromatin masses. Both these two bodies are very distinct, easily recognised in fresh preparations, and when stained by Giemsa's method the cytoplasm stains an azure blue and the nucleus a very distinct deep red.

The fact that this protozoon of trench fever is a hæmogregarine suggests the extreme probability that the *Pediculus corporis*, or what is even more likely that a louse allied to the *Hæmatopinus stephensi*, described by Newstead and Christophers as parasitic on the Indian field rat, is the carrier of the protozoon. The presence of such large numbers of rats in the trenches which come into close association with our troops seems to favour this conclusion. An effort is being made to trace out the cycle of sporogony in the stomach cells of the different types of lice commonly present in the underclothing of our soldiers.

I would like to take this opportunity of thanking Major Byam, R.A.M.C., to whom I am indebted for bringing together in one hospital the clinical material upon which the present work is being done. In addition, I would like to thank Miss Brad and Corporal Haylock, my assistants, for their help in carrying out this research. I am also much indebted to Lieutenant Wilson, R.A.M.C., who has clinical charge of these cases, for much help and valuable suggestions.

Since writing the above paper I have had opportunities of confirming the presence of the hæmogregarine in a number of other cases of trench fever, and also, in addition, in cases of D.A.H. complicated with some of the clinical signs of P.U.O. and one or two cases of definite benign tertian malaria.

In the cases of double infection, with the parasites of malaria and trench fever, a significant feature was the fact that quinine was powerless to subdue completely the pyrexial attacks which we now know were partly due to the protozoon of malaria and partly to the hæmogregarine of trench fever.

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A CASE OF INFLUENZAL MENINGITIS.

BY K. S. BHAT, M.R.C.S., L.R.C.P. LOND.,

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PATIENT, a female child, aged 14 months, admitted on March 7th, 1917, into East London Hospital for Children, Shadwell, under care of Dr. T. Fisher. The child had been ill ten days with "bronchitis" and had been treated outside. The illness started with a sore-throat; the child had vomited and gone blue in lips on first day of illness. It was coughing during five days previous to admission. The right shoulder, left wrist, and left ankle-joints were noticed to have swollen on the day before admission. No tuberculous family history.

The child looked obviously ill and semi-conscious and not quite intelligent. It would not grasp a finger put into its hand. It was very restless, jerking the limbs about now and then, and frequently uttering a sharp short cry without apparent external cause. Head was strongly retracted and neck rigid; altogether a moderate degree of opisthotonos. Arms were adducted over chest, elbows semi-extended, wrists strongly dorsiflexed, fingers bent into palms, and the whole limbs rotated so that dorsal aspects of wrists faced each other. Toes bent into soles; ankles hyper-extended. Knee-jerks very exaggerated, tending to clonus, plantar reflexes extensor. Kernig's sign was very evident in both limbs. Supinator jerk present on right side; not looked for on left. Abdominal wall lax; abdominal reflex present. Lungs quite normal: no sign of bronchitis. Heart's action rapid; nothing else abnormal about heart or pulse; rate 140; respirations 36; temperature 101° F. Spleen not palpable: liver one inch below costal margin in right nipple line. The abdominal skin was slightly inelastic. Pupils reacted normally to light. Fontanelle not bulging. The throat was slightly redder than normal; tonsils slightly enlarged. The external genitals and perianal region generally were much excoriated. Doughy swellings were present in right shoulder, left wrist and left ankle-joints; no fluid detected. Movement was practically perfect in range, but evidently painful and resisted.

On account of these swellings, and the evident meningitic condition the child was admitted into hospital with the diagnosis of tuberculous meningitis. Lumbar puncture was done soon after admission.

The cerebrospinal fluid was very slightly turbid; under slightly increased pressure. Cells 150 per c.mm.; 54 p.c. polymorphonuclears, 46 p.c. lymphocytes. In counting these 100 cells 18 "endothelial" cells also seen. Globulin slightly increased; no reducing substance present. The film made from c.s. fluid for differential count of leucocytes showed typical influenza bacilli in large numbers, both short isolated bacilli and long chain forms. These long chain forms were found to consist of the short bacilli joined end to end by a cell membrane. This resolution needed an objective of N.A. 1·3, and was better shown with an objective of N.A. 1·4. The bacilli were almost all extracellular, very few indeed being seen within the polymorphonuclears. Cultures showed the organism to be a typical bacillus of influenza. Subsequently on another lumbar puncture a culture was taken on blood agar and sent to Dr. P. N. Panton, who very kindly examined it and pronounced the culture sent to be "a typical bacillus of the influenza type."

The child seemed to be getting slightly better on the 8th and 9th. It could only take fluids, very well at some times, badly at others. Intelligence slightly better. On the 9th it would grasp a finger put into its hand. The temperature, however, was higher. The excoriations in perianal region were very much better, and the stools, green at first, had become brown. On the 10th the swellings in the joints had entirely subsided; joints were normal in every respect, except stiffness due to meningitic condition. The fontanelle had all along been level with the surroundings, and not tense. On the 10th, the physical signs were all as on admission, except that the knees were rigidly extended, and the cry less frequent. The abdominal wall was lax as before, but abdominal reflex was absent. Lumbar puncture at 2 P.M. gave slightly more turbid fluid than before: under slightly increased pressure 15 c.c. collected, but not examined. On the 11th, general condition was worse; child quite unconscious.

The head and eyes were turned to the right, but head could fairly easily be moved to the left. Opisthotonos still present, but rigidity altogether less than up to previous day. Reflexes still exaggerated (abdominal reflex absent), but not former tendency to clonus in knee-jerks. Left knee-jerk was much more brisk and pronounced than right. Joints quite normal-looking. Fontanelle slightly tenser than before; still level with surroundings. Meningitic cry less frequent. Throat was no redder than normal; tonsils remained slightly enlarged, but not acutely inflamed. Heart's action very rapid. A few fine moist sounds could be heard all over right lung. Abdominal wall quite lax; abdominal reflex absent. Liver extended to 1½ inches below costal margin in right nipple line; spleen not palpable. The feeds were being taken very badly. Stools were greenish-yellow, but perianal excoriation much better.

At 10 P.M. on the 11th the child looked very much worse. The cry had stopped. Fontanelle tense, slightly bulging.

Lumbar puncture gave 15 c.c. of very turbid fluid, like dilute milk, flowing quite freely, under slightly increased pressure. A culture from this was put up on blood agar, and sent next day to Dr. Panton, who, as said above, confirmed the organism as the bacillus of influenza. Globulin and reducing substance not tested for. Cells too numerous to be counted. On 25 squares of a Thoma hæmocytometer were two masses of 20 to 25 white cells each, and 67 discrete white cells. A film showed almost all cells to be polymorphonuclears; very few other types indeed seen. Also enormous numbers of influenza bacilli, both isolated and chain forms, almost all extracellular, very few being intracellular.

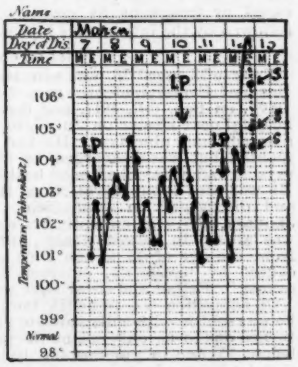
The child continued in a low state till 2 P.M. the next day (12th March), when suddenly hyperpyrexia set in, temperature rising to 107 6°.

The knee-jerks were sluggish and difficult to elicit. Left knee-jerk was even then more evident and easily elicited than right. Limbs very flaccid. No rigidity anywhere. Child was absolutely unconscious; no cry; diaphragm paralysed. Respiration very rapid and thoracic: abdominal respiratory movements reversed. Sharp moist sounds over both lungs in such abundance that it was impossible to hear the heart. Alæ nasi were working very evidently. Pulse very small and very frequent. Pupils inactive to light and very contracted. Neck quite flaccid; fontanelle not tense and level with surroundings.

A cold sponge was given without avail. The child died about 2.30 P.M.

Post-mortem report.—Both buttocks excoriated about anus. Recent emaciation in a fairly well nourished child.

Chart of a Case of Influenzal Meningitis in a child of 14 months.



LP, Lumbar puncture. S, Cold sponging.

Cranial bones: Normal. Brain: Covered with pus, both at base and vertex, as well as about cerebellum. Ventricles contained thin purulent fluid; not dilated. Pus on surface of convolutions very sticky and fibrinous. Spinal cord: Not examined. Meninges: Dura mater little, if at all, inflamed. Pia evidently inflamed.

Heart: Right side dilated. Pericardium: Contained about ½ ounce of clear yellow fluid. Right lung œdematous; strip of collapse along whole of posterior border, coming up to apex on hinder aspect. Left lung also œdematous; similar strip of collapse, but narrower and less dark. Pleura normal. Trachea and bronchi contained much frothy mucus. Bronchial glands not enlarged.

Liver: Normal; gall-bladder came to surface through liver substance about ¼ an inch above sharp margin. Spleen enlarged a little, slightly congested. Kidneys and stomach normal. Intestines: Peyer's patches very prominent and inflamed; few small hæmorrhages in some. Peritoneum and mesenteric glands normal.

Films from pus on surface of brain and from ventricular fluid showed typical influenza bacilli. The joints were not cut into.

Treatment while in hospital.—Diet fluids.

March 7th: Ung. gallæ c. opio to perianal region. Lumbar puncture.

March 9th: 11 P.M., brandy, mxx. 3 tis.

March 10th and 11th: Lumbar puncture.

March 12th: Chloral hydrate gr. 2½, potass. bromide gr. x.—in solution; one dose. 2 P.M., cold sponge.

Another child with influenzal meningitis had been treated in the hospital in October, 1912. The case has been published by Dr Athole Ross and the then house physician to the hospital.[1] References to literature will be found in that paper. I have to thank Dr. Ross for his kind help and reference, and Dr. Panton for his examination of the culture and report thereon, and my chiefs at the East London Hospital for kind permission to publish this case.

FIG. 1.

Cerebro spinal fluid, March 7th, 1917. All the intracellular bacilli in the field have been drawn, but not all the free-lying ones.

FIG. 2.

Culture from the cerebro-spinal fluid. (Not all the bacilli in the field have been drawn.)

[1] Brit. Med. Jour., 1913, ii., 1056.

A DEVONSHIRE CENTENARIAN.—Mrs. Jane Welsford, of Newton Abbot, celebrated the 103rd anniversary of her birthday on August 21st.

THE LATE DR. GEORGE METCALFE.—By the death of George Metcalfe, M.D. B.S. Durh., the community of Skelmersdale, Lancs., has lost a good friend. Educated at the Newcastle School of Medicine and St. Thomas's Hospital, Dr. Metcalfe had practised in Newcastle, Bristol, and Tottenham, and had spent some years as civil surgeon on the Gold Coast, before his appointment in 1905 to the White Moss Colliery Sick and Accident Society at Skelmersdale, where he remained until his death.

A CASE OF PERIODIC ATTACKS OF PYREXIA.

BY R. V. SOLLY, M.D., M.R.C.P. LOND., F.R.C.S. ENG.,
PATHOLOGIST TO THE ROYAL DEVON AND EXETER HOSPITAL AND TO THE GROUPED AUXILIARY HOSPITALS, EXETER.

THE following is a case of periodic attacks of pyrexia with erythematous eruption in a recruit, which were apparently cured by treatment by means of an autogenous vaccine, followed by the intravenous injection of one dose of galyl.

Notes of Case.

Private M., aged 18, was admitted to No. III. Temporary Hospital, Exeter, under the care of Lieutenant-Colonel Henry Davy, on Feb. 6th, 1917, and discharged to a convalescent hospital near Exeter on July 18th. He was in the Army as a recruit only nine days. He had been in the Navy for six months, but was discharged, as he was subject to fits. He says he had always had good health till he joined the Navy. He was sent to the Royal Naval Hospital on June 1st, 1915, and discharged on June 25th. He joined the Army in January, 1917, and epileptic fits started again. His mother was always in delicate health. She suffered from epilepsy from the age of 13 to the time of her death, which was caused by "gastritis, enlarged liver, heart disease, and cancer." Father and sister have good health.

On admission the patient's temperature was 105° F., and he was sent in with a diagnosis of pneumonia, but his pyrexia turned out to be only one of the periodic attacks, described below. When in the hospital living pediculi (capitis) were found. From admission up to March 22nd, practically every five days he had a sudden rise of temperature, up to 104° or 105°, accompanied by pains in the back of the head and limbs and by an erythematous rash on chest, arms, and face. These were red, slightly raised patches as large as a half-penny. There was no itching or burning. At the same time the face became distinctly puffy. The temperature remained up for 24 hours and then fell as rapidly as it went up. When it was falling the patient had attacks of vomiting. The pulse during the pyrexia was generally raised to 108–112; between the attacks about 70–90. The patient was otherwise well, perhaps somewhat anæmic, except for one or two attacks of epigastric pain. Nothing abnormal was detected in heart, lungs, or abdomen.

Blood count on March 1st (just after an attack): White cells, 22,000 per c.mm. Differential count: Polymorphs, 91·5 per cent.; lymphocytes, 8 per cent.; large mononuclears, 0·5 per cent.; eosinophiles, none seen.

Agglutination tests to *B. typhosus* and to *B. paratyphosus A* and *B* were carried out with a negative result. On two occasions during the attacks of fever blood cultures were performed, and on each a Gram-negative bacillus was obtained. It had the following cultural characters: motile, pleomorphic, caused general turbidity in broth, and grew freely on ordinary agar, forming a greyish-white confluent growth, with the production of an offensive odour; on potato a dark brown growth. It did not liquefy gelatine, though it grew freely at room temperature. No acid or gas in glucose, sucrose, lactose, or mannite, and no acid or clot in litmus milk.

A vaccine was prepared and several doses given, varying from 1 million up to 10 millions. The temperature appeared to have been distinctly modified by the vaccine treatment, and on one occasion there was an interval of 9 days without pyrexia, on another of 11, and finally there was an interval with only slight rise of temperature of 20 days. However, after this the periodic attacks recurred, and he had three in succession, with the usual intervals, almost as severe as when first admitted, so Colonel Davy and I decided to try the effect of an intravenous injection of one of the substitutes for salvarsan, and on June 8th I gave him an intravenous injection of 40 centigrammes of galyl dissolved in 50 c.c. distilled water. This produced no rise of temperature, and only a slight headache.

Since this injection the patient has had no rise of temperature at all and has improved in every way in his general health. A Wassermann test was carried out both before the injection and about a week after. On each occasion a somewhat weak positive result was obtained, on the last occasion there being somewhat less deviation of complement than the first. No further injections of galyl were given, nor has any mercurial or other medicinal treatment been administered.

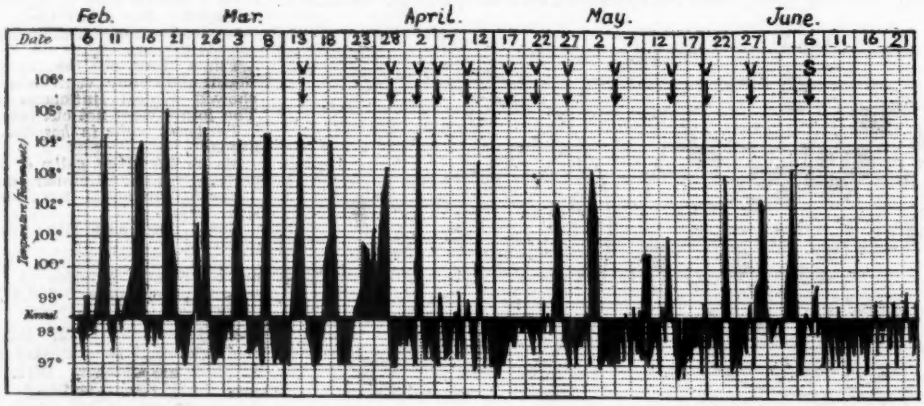
Remarks.

I am publishing this case as it stands at the particular request of Colonel Davy, though I do not pretend to be able to say what the cause of the attacks of fever was or to give a name to the condition.

In the first place, the temperature appears to have been distinctly modified by the vaccine treatment. I do not know what the organism found ought to be called. Perhaps it might come under the head of "*Bacillus fæcalis alkaligenes.*" Was it a true blood infection or only a contamination?

Looking now at the chart it seems possible that the injections were too frequently repeated, but no definite negative phase was noticed, and the object was by anticipation to prevent the recurrence of the attacks.

Chart of a Protracted Case of Periodic Attacks of Fever.



V, Injections of bacillary vaccine (16-iii., 1 mill.; 31-iii., 2·5 mill.; 3 and 7-iv., 5 mill.; 12-iv.; 10 mill.; 19, 23-iv., 5 mill.; 29-iv., 10 mill.; 7, 16, 22 and 30-v., 5 mill.) S, Intravenous injection of 0·4 gm. galyl dissolved in 50 gm. distilled water.

In spite of the positive Wassermann reaction I cannot imagine that these attacks of pyrexia were due to syphilis, and the high leucocytosis with over 90 per cent. of polymorphs is against this. Though he had not been out of England or in the trenches, he had been in contact with soldiers and pediculi were found in his head, so that it seemed possible that these attacks might be a peculiar form of "trench fever," possibly due to some unknown spirochæte or protozoon. I believe some pathologists (Carnegie Dixon and others) have obtained a positive Wassermann reaction in cases of trench fever, but the effect of injections of salvarsan did not appear to be very conclusive. In this case after only one injection given over two months ago, and with no other treatment except previous injections of vaccine, his attacks of pyrexia ceased and he has been well ever since. Of course, it is possible that the boy is a congenital syphilitic, and this is perhaps supported by the fact that both he and his mother have been subject to epileptic fits. He had not the appearance of a congenital syphilitic patient.

A CASE OF ADVANCED MULTIPLE BRAIN SOFTENING.

BY THOMAS WALMSLEY, M.D. GLASG.,
TEMPORARY ASSISTANT MEDICAL OFFICER, ROYAL ASYLUM, MONTROSE.

THE patient, a woman aged 26, was admitted to this asylum for the first time in 1889, two years after her marriage. She suffered from left otitis media purulenta, had an offensive vaginal discharge, showed the signs of prolonged alimentary disorder, but her respiratory and circulatory systems were reported normal. Her mental state was one of acute excitement of short duration, and was accompanied by well-marked motor disturbance. She was discharged in eight months' time and was then noted to be an active-minded woman, acute and penetrative, but idle, vain, and boisterous, and given to the use of coarse language. She was readmitted three years later, widowed, her husband having died in the interval in this asylum from general paralysis of the insane. She again showed signs of alimentary derangement, was anæmic, had a slight organic mitral murmur, but had no signs of organic nervous disease. She had a dull, stupid expression; was with difficulty induced to speak, and gave meaningless and mechanical answers; was degraded in her habits; and had delusions of bodily sensation inclined towards a sexual basis, "people sitting on her eyelids who tell her to do wicked things." The development of her condition was rapidly towards a complete dementia, but interrupted by short periods of excitement characterised by loud, prolonged laughter, and in 1913 by two epileptic fits. She died in 1916. The notes made shortly before her death indicate that she had become very stout, that her extremities were constantly cold and blue, her skin dry and harsh, that there was no paralysis of her limbs, and that she had cardiac symptoms pointing towards myocardial degeneration. Mentally she was in a condition of stuporose dementia; she was unable to initiate the simplest voluntary activity; she remained motionless wherever she was placed; allowed the saliva to dribble from her mouth; always required to be fed; did not attend to her natural needs; in fact, she showed a distinct resemblance to the behaviour of a decerebrated frog.

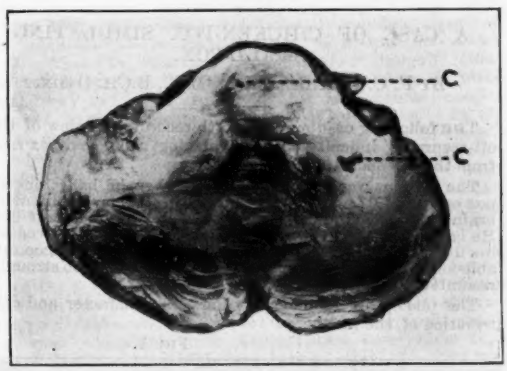
FIG. 1.

Under view of a section of the cerebrum at the level of the centrum semi-ovale showing cyst cavities (C) of the white matter.

A post-mortem examination was made on the morning after death. There were no signs of localised wastings, no marks of injury or of trophic sores on the body. There were a few small uterine myomata, chiefly subperitoneal. The pleuræ and lungs were healthy. There was no pericardial disease. The heart wall was soft, very fatty, and easily torn; all the heart valves were thickened and hard, though but slightly incompetent. The aorta showed patchy atheroma over the arch and at its bifurcation. The membranes of the brain were congested, slightly thickened, but without the signs of inflammation, and there were no subdural deposits; the pia stripped readily from the brain surface; the Pacchionian bodies seemed normal. There was a great excess of cerebro-spinal fluid, which contained a slight amount (not estimated quantitatively) of albumin. The arteries of the brain were normal in their macroscopic distribution; they showed patchy atheroma on their larger branches. The convolution system of the brain was normal in amount and not unusual in design, but the whole brain looked atrophic but was without any areas of superficial decortication.

Section of the hemispheres (Fig. 1) revealed (bilaterally) numerous cyst cavities, inconstant in size and shape, though in the same brain area tending to have a uniform conformation. They were absent from the cerebral cortex, and though a few were present in the basal ganglia they were

FIG. 2.



Section of pons and cerebellum showing cystic formation. C, Cyst.

mostly confined to the white matter and especially numerous towards the anterior end of the brain. They extended, however, through the mid-brain, cerebellum, pons, and medulla. (Fig. 2.) In all the boundary wall appeared to be smooth, though not of the nature of an "encystment capsule." The appearances presented in many instances led me to the opinion that the individual cysts had undergone a progressive increase in size, and the intervening brain substance having undergone a pressure atrophy neighbouring cysts had become confluent. I believe this to be confirmed by the fact that in every instance in which it was possible to make a complete examination of a cyst wall an aperture of communication to the surface of the brain was present; in some cases a mere pin-point channel, in others a wide slit opening in the depths of a cerebral fissure. In the latter cases it was always easy to determine the line along which the pia mater abruptly terminated and the cyst wall commenced—that is, there was no ingrowth of pia into the brain substance. I believe, however, that the cerebro-spinal fluid would enter these cavities, and would thus account for their progressive increase in size.

Microscopic examination of an affected area showed that the cyst wall was formed of brain tissue, there being no alteration in the density of the peripheral neuroglia and no decrease in the number of peripheral nerve fibres—that is, there was nothing in the nature of a lining membrane; and under high magnification the wall appeared rough in the cilia-like projections of neuroglia. Areas of commencing softening at different stages were also to be observed. In the more advanced the nerve fibres had retained their normal appearances even while the neuroglia has become more or less homogeneous. The earliest stages in which there was simply a "loosening" of the neuroglial network were found in relation to small thrombosed vessels, though other vessels, slightly larger as a rule, were to be seen, with thrombosis of long standing and an absence of perivascular softening. There was no fibrous disease of any vessel within the brain substance examined, and the number of vessels did not seem to be increased. So far as I was able to determine, there was a complete absence of a reactionary neuroglial overgrowth. The cortex was everywhere shrunken, and its cells were fewer in number than the

normal and distributed without definition—evidences of neuronic degeneration.

The cerebral lesions in this case I have thought worthy of record on account of their extensive distribution, and I am indebted to Dr. C. J. Shaw, physician-superintendent of this asylum, for permission to do so. They appear to be multiple softenings due to multiple thrombosis of cardio-vascular genesis of the "end-artery" system of the brain. They seem to be without relationship to any possible syphilitic infection, but I am unable to describe the condition of the thyroid gland.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A CASE OF CHICKEN-POX SIMULATING SMALL-POX.

BY F. C. POYNDER, M.A., M.B., B.CH. OXON.

THE following case may be worth recording in view of the oft-recurring difficulty of distinguishing a chicken-pox rash from that of small-pox.

The patient was about 4½ years old when he had chicken-pox early in 1917. He is an idiot, with maldevelopment of brain and long-standing contractures, and has frequent fits. He has had pneumonia more than once, but has survived all his illnesses, though his low vitality is apparently accountable for the character of the chicken-pox rash, which strongly resembled that of small-pox.

The photographs sufficiently show the character and distribution of the rash.

FIG. 1.

Chicken-pox rash simulating small-pox in a boy 4½ years of age. (*a*) Ventral surface.

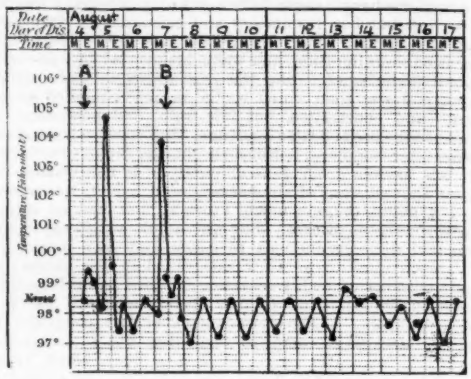
FIG. 2.

(*b*) Dorsal surface.

A CASE OF MALARIA ACQUIRED IN ENGLAND.

BY S. C. BISWAS, M.R.C.S., D.P.H., D.T.M. & H.,
RESIDENT MEDICAL OFFICER, SEAMEN'S HOSPITAL, ROYAL ALBERT DOCK.

INTEREST attaches at the present time to the possible acquirement in this country of malaria conveyed from abroad, and the following case is published with the permission of Dr. C. W. Daniels, under whose care the patient was.



Temperature chart. At A benign tertian parasites were found in the blood; at B quinine was commenced.

A. L. R., aged 33 years, aircraftsman, R.N.A.S., was admitted to the Seamen's Hospital, Royal Albert Dock, on August 6th, with the following history. On July 26th, while at Eastchurch, Isle of Sheppey, he had fever, his temperature rising to 103° F.; he felt hot and he sweated, but had no shivering. On July 28th, when in London, he had an attack of fever, with shivering, &c., and thereafter every alternate day until August 8th this attack was repeated. For the last 12 months he has been stationed at Eastchurch, where he has been accustomed to sleep in a hut with successive batches of men who have served in various parts of East Africa. None of these men, so far as he knows, was actually suffering from fever, but one of them was known to have had malaria when in East Africa. According to the patient's statement, the hut was so full of mosquitoes that on some nights he could not sleep. The patient has never been out of England.

On admission, his blood was drawn from a finger-tip, examined, and found to contain benign tertian parasites, mainly gametes. The spleen was enlarged three and a half fingers' breadth below the costal margin. There were no other physical signs and the temperature was normal. Examination of blood on the following day showed besides parasites an increased percentage (16 per cent.) of large mononuclears. The progress of the case in the hospital is illustrated by the accompanying chart, which shows two typical tertian paroxysms antecedent to the administration of quinine, and none after. He was treated with quinine hydrochlor., gr. 5 every six hours, from August 7th to 11th, and gr. 5 t.i.d. for 10 days subsequently. He was also put on tabloid ferri et arseneci co. (B. W. and Co.), one t.i.d., as his spleen was much enlarged.

Mosquitoes and chironomidæ have since been collected from the hut by a friend of the patient. Among them a specimen of anopheles, probably *A. maculipennis*, and one of *Culex* (*Culiseta*) *annulatus* can be recognised. These identifications have been confirmed by Lieutenant-Colonel A. Alcock, F.R.S.

Reviews and Notices of Books.

Elements of Hygiene and Public Health. By CHARLES PORTER, M.D. Edin. With 98 illustrations. London: Henry Frowde and Hodder and Stoughton. 1917. Pp. 411. Price 12*s.* 6*d.* net.

THERE exist already so many excellent text-books on hygiene and public health, which are kept up to date by the issue of fresh editions from time to time, that it may at first sight appear doubtful whether there is room for a new book on these subjects. The present volume, however, has been written with a definite end in view—namely, to supply the medical practitioner with concise information on only the more important aspects of preventive medicine. It deals with personal hygiene as well as public health, and emphasises the importance of a medical man regarding his patient, not merely as a person to be rendered healthy but as a being to be kept healthy. In view of increasing demand for medical men in the public health service and of the part played by the medical practitioner in any scheme for the prevention of disease, it is surprising that more attention is not devoted to the teaching of public health to our medical students, and that it does not form a more important subject in the medical curriculum. We believe that Dr. Porter's book will be found useful in supplying information, which though untested by examination will be found of great benefit. Its careful study, either in student days or after graduation, will well repay the medical practitioner for the time thus expended. In the sections devoted to the consideration of disease the reader is credited with already possessing fair knowledge of the subject, and attention is chiefly directed to causation and prevention. Considerable space is devoted to a review of the more important aspects of sanitary science, while statistics and sanitary law are more briefly dealt with, the object being only to provide such information as will enable the medical practitioner to perform his duty as part of the public health service.

In a chapter upon occupational diseases and industrial hygiene Dr. Porter has succeeded in putting together a large amount of valuable information in relatively small space; but many of the subjects are necessarily treated very briefly, and it is a defect in a serviceable book that too few references are given to sources of information which would enable the reader to pursue his studies further in any particular direction. There are a large number of good illustrations, many of which have been specially prepared for the work, and a comprehensive index permits of easy reference.

Theophrastus and the Greek Physiological Psychology before Aristotle. By GEORGE MALCOLM STRATTON, Professor of Psychology in the University of California. London: George Allen and Unwin, Limited; New York: The Macmillan Co. 1917. Pp. 227. Price 8*s.* 6*d.* net.

WITH the exception of his "Characters," a series of what may be termed in modern language "articles," on various types of men of his day, Theophrastus is almost unknown to the majority of ordinary readers. But he was a widely read and highly intellectual man, he wrote treatises upon nearly every department of inquiry of which the names at least have survived in the catalogue drawn up by Diogenes Laertius, to the number of some 200. His extant works, besides the "Characters" already mentioned, consist of two botanical works, portions of a history of physical opinions, and a fragmentary discussion of metaphysical problems. He succeeded Aristotle as head of the Peripatetic School at Athens in the year 323 B.C., a position he held until about 288.

The little treatise on the Senses, a complete translation of which has now for the first time been given us in English by Dr. Stratton, deals not only with the ordinary five senses, but in addition with such subjects as pleasure and pain and intelligence. The treatise is extremely interesting because it not only contains Theophrastus's own opinions on the subject matter, but contains a résumé of his predecessors' views, together with shrewd criticism thereof. The writers with whom he deals are Alcmaeon of Crotona, Anaxagoras, Clidemus, Democritus, Diogenes of Apollonia, Empedocles, Parmenides, and Plato. Heraclitus is just mentioned as belonging to the school which attributed sense perception to contrast. Dr. Stratton prefaces his translation of and notes to the De Sensibus with a précis of Theophrastus's own doctrine on the subject gathered from the treatise in question and certain of his other treatises, such as the De Odoribus and De causis Plantarum. Then follows a chapter on Theophrastus's Method of Criticism in which Dr. Stratton fairly sets out the weaknesses as well as the high order of the Greek philosopher's judgments, showing, however, that the virtues predominate. The remainder of the book is taken up by the translation, with the Greek text and notes, which in many places may be called a commentary, on the same.

English readers owe Dr. Stratton a debt of gratitude for having provided them with an eminently readable translation of a very interesting treatise. In one place we would make a suggestion as to a possible alteration in a note, and that is in section 77, where Theophrastus is dealing with Democritus on colour. According to him, says Theophrastus (*v.* p. 136), τὸ δὲ κυανοῦν ἐξ ἰσάτιδος καὶ πυρώδους, σχημάτων δὲ περιφερῶν καὶ βελονοειδῶν, ὅπως τὸ στίλβον τῷ μέλανι ἐνῇ. This Dr. Stratton translates: "Indigo" (that is, the colour, not the substance) "is a mixture of woad and fiery red, with round figures and figures needle-shaped, to give a gleam to the colour's darkness." In his note on the passage he says: "Indigo is said to show a copper-violet lustre when rubbed. It is to this aspect that Democritus is, perhaps, attempting to do justice." What the Greeks meant by κύανος, from which κυανοῦς is derived, is uncertain; sometimes it obviously refers to a blue enamel, but we would suggest that in this passage Democritus was referring to lapis lazuli, a mineral which, although mainly of a beautiful blue colour, often shows sparkles and flakes of pyrites, "figures and figures needle-shaped," which gleam through the blue. Indigo does show (in the solid state) a coppery iridescence, but, to our thinking, lapis lazuli is more compatible with Democritus's description than is indigo. Pliny (N.H., xxxvii., cap. 9) mentions a stone called Cyanos, which he says is a kind of jasper with a blue colour, and as Philemon Holland translates, "You shall perceive a certaine pouder in them as it were of gold, and yet not like to that of Saphires; for the Saphire also glittereth with markes and prickes of gold. Saphires are likewise sometime blew, ... yet in no place be they transparent."

Handbook of Physiology. By W. D. HALLIBURTON, M.D. Lond., F.R.C.P. Lond., LL.D., F.R.S., Professor of Physiology, King's College, London. Thirteenth edition (being the twenty-sixth edition of "Kirkes' Physiology"). Nearly 600 figures. London: John Murray. 1917. Pp. 930. Price 16*s.*

THE appearance of the twenty-sixth edition of this book is signalised by a publisher's note which contains an interesting account of its history. The first edition was published in 1848, its author being Dr. Kirkes, who was at that time lecturer in physiology at St. Bartholomew's Hospital. During the next 38 years the book passed through 13 editions and underwent considerable change and growth at the hands of its various editors, among whom may be mentioned Mr. Morant Baker and Dr. Vincent D. Harris. In 1896 the long association of this work with St. Bartholomew's Hospital came to an end and Professor Halliburton became its editor. Under his ægis the book has passed through 13 more editions and has been remodelled so completely that little trace remains of its original authorship. This work, therefore, has been a familiar figure on our bookshelves for the last 20 years and, as in the case of all old friends, criticism of its merits is inevitably influenced by sentiment. The truly impartial critic is the student who approaches the book without prepossession, and the rapid appearance of one edition after another is the surest evidence of the student's appreciation of its merits.

The chief feature of the present edition is the inclusion of the Basle nomenclature. For the most part the new names have merely been inserted in brackets after the old ones, but occasionally they have been actually substituted for the old ones. The widespread adoption by anatomists of the new nomenclature makes this change almost unavoidable, although

the occurrence, side by side, of two names for the same thing must be very confusing to the student. Considerable additions have also been made to the chapter on the ductless glands, and new figures have been added to the section on the central nervous system. We could have wished that, in view of their extreme importance in practical medicine, the author had dealt more fully with the recent work on the output of the heart and on the various ways in which its efficiency as a pump is maintained.

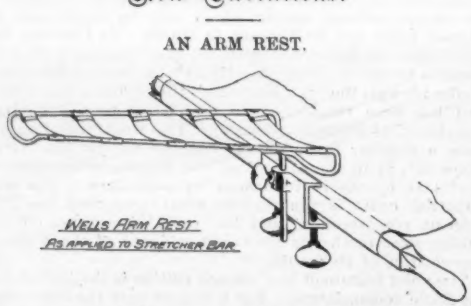
Facts and Fallacies of Compulsory Health Insurance. By FREDERICK L. HOFFMANN, LL.D., Statistician, The Prudential Insurance Company of America; Fellow, American Statistical Association, Royal Statistical Society, &c. An Address read in part before the Section on Social and Economic Science of the American Association for the Advancement of Science, Dec. 28th, 1916, and the National Civic Federation, Jan. 22nd, 1917. Pp. 101.

IN a pamphlet which is distinguished by orderly arrangement and lucidity Dr. F. L. Hoffmann examines the existing systems of National Insurance in Europe—that is to say, in Great Britain and Germany—with a view to ascertaining how far a similar system, based upon the experience of the nations named, would be likely to prove beneficial if adopted by the several States of America and the Federal Government. His investigation is hardly of a judicial character, and no doubt he would reply that he did not intend it to be, and that his advocacy, directed intentionally against such proposals and suggestions in favour of National Insurance as may be current in the United States, could be in no way disguised. Nevertheless, he has selected statements of facts and of opinion for citation rather too exclusively from the utterances of those hostile to National Insurance, at any rate, so far as this country is concerned, and has contrived to give the impression that nothing is to be said on the other side, and that with us no voice could be raised worth listening to in support of any view different from his own. His work in this respect is therefore rather less interesting than are his comparison of social conditions in America with those prevailing here, and his suggestions as to possible social legislation for the national health in his own country.

On the whole, however, he makes out a strong case in favour of the non-adoption, or of considerable caution in the adoption, in America, of the examples set by us and by Germany, and he is no doubt right in what we are inclined to regard as his main contention, which is to be found summarised on p. 94. He there says that pecuniary support, except during very prolonged sickness, "is not a matter of economic importance to the average American wage-worker, more properly concerned with an increase in wages and a decrease in working hours and other matters concerning the maintenance and the raising of his standard of life." Similar tendencies in social and national health development are not unobservable here, and are likely to become more conspicuous when peace permits.

New Inventions.

AN ARM REST.



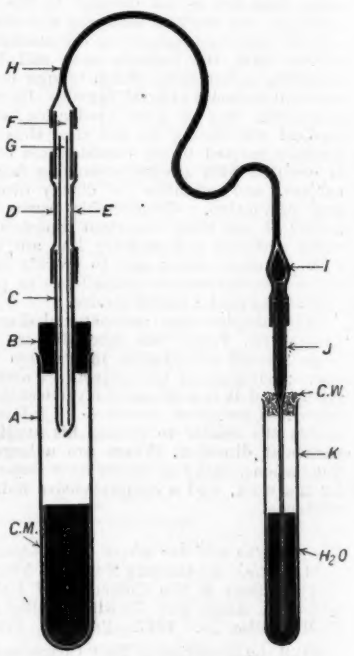
DURING the present prolonged war much time and thought have been devoted to the preservation of damaged limbs. Varied and cleverly contrived apparatus has enabled us to maintain them in comfortable positions, so that the continuity of the shattered bones may be ensured, and no effort spared to preserve the former usefulness of the damaged limb. No difficulty therefore has been as yet experienced in this direction, and it is only in regard to the question of transport that any feeling of anxiety arises. On board ship I have experienced great difficulty in transferring damaged arms, when placed in an extended position, from the ambulance to the ward, and I want to draw attention to the simple contrivance which has made this transference easy on board the H.M.A.T. *St. Andrew*. The apparatus is very simple, light, and cheaply produced. It can be quickly and securely adjusted for use either on a stretcher, a ship's cot, a train bed, or hospital bed. After months of use I can confidently recommend it. The arm-rest may be obtained from Messrs. Arnold and Sons, Giltspur-street, London, E.C.

THEO. M. KENDALL,
O.C. troops, H.M.A.T. *St. Andrew*. Major R.A.M.C.

APPARATUS FOR THE ISOLATION AND CULTIVATION OF ANAEROBES.

To simplify the cultivation of anaerobes, the apparatus here illustrated has been fitted up.

To expel the air, the apparatus is heated in the autoclave. Air and steam escape through the cut (E) in the rubber tubing (D) (Bunsen's valve). When the apparatus cools, the steam condenses and atmospheric pressure closes the slit and prevents air entering. At the same time water rises in the pipette (J) as far as the glass bead (I). To inoculate the culture tube (A) an emulsion of the material to be cultivated is made in a tube of recently boiled broth or saline, and the end of the pipette (J) is placed in it and the rubber round the glass bead (I) is made oval by pressure with the finger and thumb. When the fluid has entered the large tube, the pressure is relaxed.



A, Test-tube containing culture medium (CM). B, Rubber cork with glass tube (C). D, 3-in. good rubber tubing with longitudinal slit ¼-in. long (E) made by a sharp knife (exit valve). F, Glass tubing. G, Glass tube or rod to give rigidity to D. H, Rubber tubing collapsed on account of vacuum in A. I, Glass bead to occlude H (inlet valve). J, Pipette occupied by water from K, after the whole apparatus has been autoclaved. CW, Cotton wool.

If it is desired to isolate the various species of bacteria in a mixture, agar is used instead of broth for the culture medium in the large tube. This is melted, and before solidifying is mixed in the manner above described with the emulsion. The agar is then sloped or distributed over the walls of the tube by gentle rotation.

Anaerobic blood cultures can be made direct from a vein by substituting a hypodermic needle for the pipette.

I am indebted to Corporal H. J. Mann, S.A.M.C., for his assistance.

ALFRED R. FRIEL,
B.E. Force, France. Captain, S.A.M.C.

TAUNTON AND SOMERSET HOSPITAL.—The Prince of Wales has given £100 to a fund which is being raised to discharge the debt of £4000 which exists against the Taunton and Somerset Hospital.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 8, 1917.

The Etiology of Some Obscure War Diseases.

THE association between war and pestilence is proverbial, and it is one of the triumphs of medicine that in this greatest of wars we have been spared grave epidemics. A comparison between the mortality from wounds and disease in this war and in the South African War gives a measure of the unchallenged advance of preventive medicine. But fresh forms of disease have called for increasing vigilance and research. Some of these have been widespread, yet of low mortality—for instance, epidemic nephritis, almost unknown in warfare, except in the American Civil War, has been prevalent in France, though absent from the British training camps. The immediate death-rate of this nephritis has been small, but it is too early yet to gauge the ultimate damage which has been accomplished by the disease. Probably it is due to an infection, but, unfortunately, the organism is still unknown, and while this is so no effective means of prevention can be adopted. In spite of this there is good ground for believing that, as in the later phases of the American Civil War, epidemic nephritis is gradually diminishing. In every war indeterminate fevers have abounded. In South Africa we heard much of "simple continued fever," which in the majority of cases was probably merely a mild form of typhoid fever, for in uninoculated patients the Widal reaction was generally found to be positive. The absence of this type of simple continued fever now is correlated with the control that has been acquired over typhoid fever and its congeners. But from the medley of irregular pyrexias, myalgias, rheumatisms, and "influenza" the features of a definite disease have been gradually recognised and labelled trench fever. The headache, drowsiness, and pains in the shins were associated with a relapsing fever, the course of which suggested the activity of a hæmatozoon. The work of Captain J. W. MCNEE and Lieutenant A. RENSHAW[1] showed that there was something in the red corpuscle of infected persons which was capable of conveying the disease to others, but no actual organism was found, although the punctate basophilia found was the subject of remark. On another page we print an interesting and important communication from Captain LYN DIMOND which points to the presence of a hæmogregarine as the cause of this form of relapsing fever. The blood from cases of trench fever was hæmolysed by the addition of a saponin, after which the parasite could be found moving in the centrifugalised deposit. The hæmogregarine was also discovered in the liver, and less constantly in the spleen and lung, rarely in the lymphatic glands and not in the cerebro-spinal fluid. Spleen puncture was found to be the quickest way to establish the diagnosis. The broad facts of the life-cycle of the parasite appear to be established. A day or two before the onset of pyrexia macromerozoites are found free in the plasma of venous blood, and micromerozoites, which are more commonly encysted. These merozoites increase in number up to the height of the fever when they disappear, and the day after the pyrexia only the parthenogenetic macrogamatocyte can be found, which undergoes division into 20 macromerozoites just before the rise of temperature, when sporulation occurs. This is the asexual generation, but the main features of the sexual generation have also been observed.

If further investigation confirms the suggestion that the protozoon of trench fever is a hæmogregarine, it becomes highly probable that either the *Pediculus corporis* or a louse allied to the one parasitic on the Indian field rat, is the carrier of the protozoon. The association of this fever with trench life, where large numbers of rats come into close association with the troops, favours this conclusion. Trench fever is not dangerous to life, but it is a cause of considerable suffering and much incapacity. It is probably one of the various infections and intoxications which lead to disordered action of the heart, and thus is responsible for much prolonged disablement. Its effective treatment is accordingly a matter of much importance, and so far nothing has been found to cut short its course. The case recorded by Dr. R. V. SOLLY in another column in which the character of the fever raised a suspicion of trench fever, was cut short by a single dose of galyl, although other observers have had negative results with the same drug. Special interest therefore attaches to Captain DIMOND'S observation that trypaflavine slows the movements of the parasite *in vitro*, and has given good clinical results when administered intravenously. The growth of our knowledge of trench fever is a typical example of the steps by which such problems are solved. Similar steps are well illustrated in our knowledge of certain nervous diseases. For instance, "locomotor ataxy" describes a symptom, "tabes dorsalis" correlates this with an anatomical lesion. But a great advance was made when this lesion was traced to a parenchymatous degeneration of the lower sensory neuron produced by syphilis. In trench fever the stages have been the recognition of certain scattered symptoms as due to some common cause—then the recognition of this cause as a specific infection; and, finally, the identification of the responsible parasite. It emphasises, again, the importance of studying the etiology of disease and the way in which the centre of interest is shifting from the wards to the laboratory.

This is further brought out by another paper in our present issue on a form of purulent bronchitis by Captain A. ABRAHAMS and others. We previously published a communication on this subject from one of our base hospitals in France, so that the disease is evidently widespread.

[1] Brit. Med. Jour., 1916, i., 225.

Unfortunately the mortality is high—of the cases reported from France the death-rate when the epidemic was most severe was 45 per cent., while that of the Aldershot cases was 25 per cent. The chief clinical features would appear to be the characteristic expectoration of yellowish-green masses of pus which may be the first symptom, the rapid respirations, the extreme tachycardia, the marked cyanosis, and an ante-mortem drop of temperature, an evidence of the extreme toxæmia. The morbid anatomy of the lung shows the bronchioles to be completely obstructed with pus, catarrhal cells, and débris, with small round-cell infiltration immediately surrounding them. The alveoli are usually very little affected, and though there may be a secondary broncho-pneumonia this is not characteristic of the disease. The other lesions found are evidences of toxæmia and of failure of the right side of the heart. Treatment has not been satisfactory. The early recognition of the case by the character of the sputum is of primary importance, for if the patient is allowed to struggle against the disease at the beginning the outlook is made much worse. If cyanosis supervenes the prognosis is grave. Both sets of observers are agreed as to the etiology of the disease—it is primarily influenzal—Pfeiffer's bacillus seems to be constantly present. But there is usually a mixed infection, pneumococci being the organism most frequently associated with the influenza bacillus. It may be asked why, with two such well-recognised organisms, should we meet with a new and dangerous form of bronchitis? The suggestion is that it is an example of exaltation of virulence by symbiosis. The pneumococci found in the earlier stages are of low virulence, but the two organisms stimulate the virulence of each other, and the fatal termination is by a pneumococcal septicæmia. So that the symptom of an "acute suffocative catarrh" is traced to an obstruction of the bronchioles by purulent exudate with peri-bronchial infiltration as its anatomical basis, and this in its turn is traced to a double infection, apparently with true symbiosis. Certainly investigations of the etiological factor in these two diseases, trench fever and purulent bronchitis, have yielded results full of interest and promise.

Originality and Enterprise: the Value of Publicity.

IN an article on the opening page of the *Paris Médical*, which is so usefully given up to a broad presentment of current topics, Professor G. LENOSSIER, of Lyons, discusses the relationship of French science, and especially of medical science, to the outside world. France, he says in effect, is not making that impression on contemporary science or contemporary medicine which is fairly due to her originality. French scientific work is annexed on its appearance by groups of workers who diligently follow it up on the lines of the originator without giving him the credit to which he is entitled, and who often, indeed, find some defunct Herr Professor on whom the posthumous honour of the discovery is laid. For every five French-men who do original work Professor LENOSSIER complains that there are one hundred Germans who accumulate documents. The Central Empires are the home and have a monopoly of the Central-blatt to which all the world turns for a summary of original work wherein, with immense diligence and a little bluff, Germany is enabled to take credit for vast scientific production and for conferring on the rest of an admiring world the hygienic and scientific blessings enjoyed by the Fatherland. A number of French journals, Professor LENOSSIER tells us, have replied by ceasing themselves to print abstracts of German articles. In this ostrich-like course he sees only a poor imitation of the methods of the adversary, preferring himself rather to dispense both with obscurantism and bluff, and so to organise the home scientific army as to carry a frank and honest campaign over into enemy territory, to that enemy's discomfiture and the approval of onlooking neutrals.

And this course French medicine and surgery have been taking to some effect in the publication of an admirable series of war monographs in the Horizon Collection, the dissemination of which among the English-speaking people of Europe and America has been assured by the translations prepared by the University of London Press under the general editorship of Sir ALFRED KEOGH. The views expressed are those of first-rate French authorities, speaking from extensive practical knowledge which cannot fail to serve as a valuable asset to the less experienced, enabling them to derive the utmost value from the experiences which will in time be theirs. The predominating note of the series is the exhaustive, practical, and up-to-date manner in which it is handled, along with a clearness of view and logical sequence of thought eminently characteristic of the French genius. Great as have been the advances through all departments in enterprise and activity during the war, the progress made by the medical branch may fairly challenge comparison with that in any other, and among the assistance rendered by our great ally to the common cause Sir ALFRED KEOGH finds this brilliant contribution to professional knowledge by no means the least. Here then is propaganda in Professor LENOSSIER'S sense—the ensuring of wide publicity to work of talent and promise, done for the furthering of the object in view and not with any ulterior motive. These admirable monographs, many of which we have already briefly reviewed, will accompany the military physician and surgeon now and when he returns to his peaceful pursuits, and the names of the authors will remain fixed in his memory. Such honest and effective propaganda can hardly miss its mark.

But the idea of the Central-blatt, or responsible and inclusive abstraction of contributions with references and bibliography, is in itself not a bad one. Those who read German medical books are constantly struck by the fact that references are almost exclusively made to German works, or when others are included the reference is indirect through abstracts made in one or other of the two principal German medical journals. Our own medical literature is by no means free from a

similar reproach. In America, and probably also in Japan, a more impartial view is obtained of the medical productions of Europe in general. As in France, so here, the scientific habit of mind has not run to the production of a Central-blatt. In this country only the *Journal of the Chemical Society* has carried out anything like a systematic abstraction of the scientific work of all countries in its own department of science. It is a work which cannot be left to a few diligent but limited officials, but requires the close attention of the foremost intellects of the scientific world, and it is, we believe, on these lines that the chemical abstracting is done. The unwisdom of refusing to recognise credit where credit is due is accepted by the Chemical Society, and appears in the fact that the excerpts from German chemical literature are as complete and as carefully done as they have ever been. Non-tendencious abstracting requires a generous mind as well as a wide knowledge of the subject in hand, and is justified in the long run by the confidence of fair-minded readers. Medicine deserves an inclusive compilation on similar lines. International conferences and the like have in recent years rendered the medical and surgical practice of civilised countries, if not uniform, at all events capable of expression in common terms. It should not be outside the genius of a capable body of medical abstractors to condense with fairness and impartiality the main foreign scientific work, and in so doing to detect originality at an early stage and indicate fruitful lines for others to follow up. Originality is doubtless not less exceptional in medicine than in other faculties, but enterprise may not have been as carefully cultivated, and in the *lutte scientifique* which Professor LENOSSIER assures us is to follow the war this quality will stand us, too, in good stead.

Annotations.

"Ne quid nimis."

SCIENTIFIC AND INDUSTRIAL RESEARCH.

THE Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916–17 was issued last week, and in it the Advisory Council state "We have made progress." The establishment in December last of a separate Department of State entrusted with the organisation of scientific and industrial research has brought encouragement to the efforts of the Committee and the necessary financial support. Progress, however, is admittedly slow, for the calls of war continually grow and the numbers available for other work, though important, continually shrink. During the year the members of the Council have addressed themselves in the main to the organisation of industrial research, firstly because they felt the paramount importance of arousing and securing the interest of manufacturers in the application of science to industry, and secondly because the influence of the war has created in industry an atmosphere conducive to the growth of new ideas, while it has also impeded the prosecution of work in pure science. In the first part of the report the Council allude to the steps which they have been able to take during the past year to organise a systematic approach to the problem of industrial research on a coöperative basis wherever this method of finance is practicable, the State Department itself helping in those important fields of work which call for independent State action. The report discusses the necessary part played by surveys in the work of research, as well as the limits within which the responsibility for them should rest with the Department; evidently the position has been carefully considered. In the second part of the report the progress made in a number of sporadic investigations aided and initiated by the Department is described. After the war the number of research workers both in pure science and technology will in all probability be greatly increased, and it is good to learn that the best means of encouraging inventors and aiding individual manufacturers are receiving the attention of the Committee.

WOUNDS OF THE CHEST WALL AND LUNG.

APART from a simple thoracotomy, the surgery of the chest has been until recently hardly more than the occasional task of the specialist, and the whole region of intrathoracic operation was summed up not long ago in a treatise of no great size by two specialist surgeons of Bonn. There has been a not unnatural hesitation in interfering at close quarters with the central mechanism of circulation and respiration, and only extreme urgency has induced the general surgeon to handle the lung in exceptional cases. But the rifle bullet and the shell fragment have had no such fine feeling, and where they lead the surgeon must follow, with the result that a new chapter in war surgery is being written. Obviously, a large proportion of shell wounds of the chest are likely to be immediately fatal from shock or hæmorrhage before any kind of help is available. On the other hand, perforation of the chest and lung by a high-velocity rifle bullet may be a very simple affair. But between these extremes there has been opened up a wide field in which the skill and discrimination of the surgeon counts for much, and we welcome the important contribution to the subject by Lieut.-Colonel T. R. Elliott, which we publish at the front of this issue. Colonel Elliott deals in the first half of his paper with the after-histories in the United Kingdom of 170 cases of chest wound seen by himself during the first two years of war at a base hospital in France. These patients were transferred to England generally in the third week after their injury, and having arrived safely at this stage, they practically all survived, and in a very large proportion of cases were able to resume duty again within a few months. In the absence of sepsis—that is to say, in about three-quarters of the cases—the results appear to justify neither the removal of a retained projectile nor the tapping of a hæmothorax unless of large size. These points are suggestive and demand confirmation. The second part of Colonel Elliott's analysis, dealing with the mortality among chest wounds in France, records the experiences of French as well as of English surgeons, amongst whom he specially mentions Dr. Pierre Duval, officer in charge of Auto-chir. (i.e., Ambulance Chirurgicale Automobile) No. 21, whose monograph on "Les Plaies de Guerre du Poumon" has just been published by Masson et Cie, Paris. Colonel Elliott states that the impression

is gaining ground that chest wounds are more fatal than was at first supposed. Whatever this mortality may be, the deaths almost all occur in the first month. No figures, he says, have been collected for deaths from hæmorrhage and severe injury in our field ambulances, but it is probable that 10–15 per cent. may die in medical units from the severity of their injury and a further 10 per cent. at the casualty clearing station from complicating sepsis. Médecin-chef Duval, from an analysis of nearly 3500 hospital cases, agrees in giving the general mortality at 20 per cent., reaching 25 per cent. or more of the cases retained at the *postes de secours*. The first day accounts for at least a third of the deaths, the first and second for nearly two-thirds. Both observers find the mortality largely influenced by the nature of the projectile; for the battles of the Somme Duval places the percentage death-rate for rifle bullets at 5–15, for other missiles 25. Lung wounds with a closed chest wall were fatal in 15, with an open wound in 27 per cent. of cases. Both the French and English authorities recommend an early cleansing operation as a preventive measure against the appallingly high death-rate of infected chest wounds treated conservatively. Colonel Elliott mentions two surgeons whose pioneer work has already shown that these thoracic operations are practicable under military conditions in the field. Médecin-chef Duval suggests, as an alternative, rushing the cases down to the clearing station after applying a simple occlusive dressing; his book contains a full exposition of the methods he uses, and of recovery in cases which might well have been considered hopeless. This chapter of war surgery is as promising in its possible results as it is new and fascinating in its practice.

THE MEDICAL EXAMINATION OF AVIATORS FOR THE AMERICAN ARMY.

THE United States is rapidly preparing a stupendous addition to the air forces of the Allies. 30,000 aeroplanes with the requisite men is the smallest figure mentioned, and this number might be sufficient to have a decisive effect on the war. The pioneer of aviation, Wilbur Wright, asserts that if the United States could put 10,000 aeroplanes into immediate service the war might be brought to an early conclusion. In the *Cleveland Medical Journal* for August Dr. W. B. Chamberlin has described the medical examination of recruits for the American air service, which is characterised by that thoroughness and sagacity which we have learnt to expect from our new ally in all her preparations for war. For the air service she is demanding practically the perfect man. He must have had two years' college work or its equivalent. In addition to the usual physical requirements he must have perfect hearing and sight without the aid of glasses. Still more important, he must have a correct sense of equilibration. Without this a man might easily be eligible for almost any branch of the Army service. Up to the present the tests for aviators in America have been crude. The United States is probably the first great Power to call in experts outside the Army Medical Corps to formulate tests. Her requirements to-day are more rigid and exacting than those of any other nation. Man's knowledge of his position in space is gained from three sources —muscle sense, eyesight, and vestibular apparatus. The importance of the latter to the aviator is great because under certain conditions he receives little help from the two former. Seated in his machine he receives small aid from his muscle sense, while his frequent passage through clouds or at night in complete darkness may deprive him of the sense of orientation gained through the eyes. He has become for the moment the bird flying through fog or mist or the bat flying by night. He must depend entirely upon a sense of equilibration given by an unimpaired vestibular apparatus. The American recruit is therefore put through Bárány's tests. Seated in the revolving chair with eyes closed and head tilted 30° forward (bringing the horizontal semicircular canals into the plane of turning) he is revolved 10 times to the right in 20 seconds. When the chair is brought to rest and vision directed on a distant object horizontal nystagmus to the left should occur for 26 seconds. A variation of 8 seconds more or less is allowable. The test is then repeated in the opposite direction. Pointing is then tested. If the normal individual, with eyes closed, extends his arm straight before him and touches the examiner's finger he can bring his arm to the perpendicular and again touch the examiner's finger without deviation to the right or left. This test is made for both the right and left arm. The recruit is now turned 10 times to the right. When the turning has ceased he is directed to touch the examiner's finger and touch it again after bringing the arm to the vertical. He will now point several inches to the right. This is called "past-pointing." The normal subject will past-point three times to the right and then again point correctly. The test is made with both arms. It is then repeated after turning to the left. If the recruit past-points more or less than three times he is rejected. The vertical semicircular canals are tested by inclining the head 90° forward, thus bringing them into the plane of turning, and the recruit is turned 5 times to the right in 10 seconds. On raising his head or body to the vertical it inclines to the right. The recruit is then turned to the left and the test repeated. Failure in these tests means rejection. In borderland cases resort is had to Bárány's caloric test.

POLIOMYELITIS IN ENGLAND: A REVISED MEMORANDUM BY THE LOCAL GOVERNMENT BOARD.

IN view of the recent occurrence of cases of acute poliomyelitis in a number of different districts in England, the issue by the Local Government Board of a revised Memorandum on the disease is opportune. The Memorandum contains an up-to-date résumé of the chief characteristics of the malady, together with valuable suggestions on preventive measures. It is recommended that sanitary authorities should be prepared to give facilities for the examination by competent bacteriologists of materials derived from the sick. Stress is laid on the importance of lumbar puncture being performed as early as possible in acute cases where there is doubt in the diagnosis between cerebro-spinal fever and poliomyelitis. In the former the presence of the meningococcus is characteristic of the disease; in the latter this organism is never found in the spinal fluid, but there is in the fluid an excess of lymphocytes. The importance of early serum treatment of cerebro-spinal fever is another argument in favour of lumbar puncture being performed in all doubtful cases where the possibility of this disease cannot be excluded by other methods of diagnosis. As poliomyelitis can be recognised by

histological examination of the affected portion of the cord, such examination should be made in fatal cases in which there is a suspicion that it was the cause of death. Pieces of the cervical and lumbar enlargements, if not the whole cord, should be forwarded in 10 per cent. formalin to a competent pathologist. It is intimated that the Board is prepared for the present to examine specimens of cerebro-spinal fluid or spinal cord, addressed to the Medical Officer, Local Government Board, and forwarded in accordance with the regulations of the Post Office. Active coöperation between the medical officer of health and the medical practitioners in a district facilitates administrative control over poliomyelitis, and, in view of the difficulty in diagnosing certain forms of the disease, medical practitioners should be invited to confer with the medical officer of health as to cases of anomalous illness. All cases of poliomyelitis should be isolated, and if this cannot be done under proper conditions at home the patient should be treated in an isolation hospital. As it has been shown that the virus may be present in the nasal mucous membrane, an antiseptic solution should be applied by means of a spray to the throats and nasal passages, not only of the patients, but of all persons brought into contact with them. A 1 per cent. solution of peroxide of hydrogen or permanganate of potash, 1 : 2000 in 0·8 per cent. solution of chloride of sodium, can be used as a throat-wash and gargle. All discharges from the patient and all articles soiled by such discharges should be immediately disinfected, as well as the sick room and its contents at the end of the illness. Those closely attending on the sick should avoid any contact with others, especially with children, which might lead to infection, and no child from an infected family should be allowed to attend school. A form of inquiry has also been prepared by the Local Government Board which will, in future, be sent to each medical officer of health reporting a case of poliomyelitis to the Board in the weekly returns of infectious disease. It is hoped that this form may be useful to medical officers of health in making their own investigations regarding cases of poliomyelitis.

MIGRATION OF PROJECTILES IN THE BLOOD STREAM.

WE recorded recently[1] a case, reported by an American surgeon in France, of the migration of a fragment of shell from the femoral vein to the right ventricle. The condition remained unsuspected until the autopsy. The story has been capped by Dr. Specht, surgeon to a German military hospital, who found[2] a shell fragment in the *left* ventricle at the autopsy on a man who died of sepsis after a deep wound of the thigh. In this case the foramen ovale was widely open and the fragment must have passed through the aperture to the position beneath the flap of the mitral valve where it was found. The man lived ten days after his injury, but no symptom whatever had pointed to any involvement of the heart. Dr. A. Rudolf Jaffé, assistant surgeon at the same hospital, relates a series of interesting cases from German literature of which the most remarkable was recorded by Freund and Caspersohn, who removed from the lumen of the right ventricle a shrapnel ball 13 mm. in diameter. In this case, although the wound was situated at the edge of the right costal arch in the nipple line, and the projectile might therefore have entered the right ventricle directly, the surgeons found no sign of wound of the heart wall nor effusion into the pericardium, and concluded that the ball had entered the vena cava, thus reaching the ventricle indirectly. As the patient recovered no opportunity offered for verification of this assumption. Jaffé adds a case observed by himself, in which a Russian rifle bullet, wounding the pelvis near the posterior spine of the ilium, entered the inferior vena cava and was carried thence to the right ventricle, where it was found at the autopsy lying beneath a flap of the tricuspid valve. No thrombus was present, but the endocardium and valve were swollen and blood-stained. In this case the patient had complained during life of pain over the heart. The occurrence of free projectiles in the blood stream, although doubtless very rare, has already become something more than a surgical curiosity, and its possibility may well be borne in mind by those who observe anomalous symptoms after gunshot wounds, especially when the projectile is not found.

[1] THE LANCET, 1917, i., 542.
[2] Münch. med. Wochens., 1917, i., 893.

POISONING BY CYANIDE GAS.

POISONING by hydrocyanic acid taken by the mouth is a common occurrence, but the recorded cases of poisoning by hydrocyanic acid gas are few. The latter danger is, however, gaining in importance in view of the introduction by the U.S. Public Health Service of cyanide gas for ridding ships of parasites, including rats and fleas.[1] In the *Medical Journal of Australia* Dr. A. M. McIntosh has reported a case which may serve as a warning against the use of this method without extreme precaution. Some rooms in Brisbane were fumigated by cyanide gas under the supervision of a chemist experienced in this work. A small room of 1300 cubic feet was being treated. The cyanide was placed in a dish, the water and sulphuric acid mixed, and the mixture poured on to the cyanide. The room had previously been sealed, excepting one door for exit, and the addition of the fluid to the cyanide caused a great evolution of gas, with the result that the operator inhaled sufficient of it to make him dizzy. He immediately dashed from the room and called to his assistant to close the door and seal it up. Assistance was summoned and, on arrival, it was found that he had quite recovered from the effects of his inhalation; but when the room was visited the assistant was seen lying on the floor unconscious, with his head near the dish containing the cyanide. This was about three minutes after the principal had left the room. The assistant was quite unconscious, his breathing had stopped, his pulse could not be felt, and he had lost his corneal reflex. He was hurriedly pulled out of the room and carried into the open air. Under artificial respiration he began to breathe, at first slowly; oxygen was administered and strychnine sulphate, gr. 1/20 hypodermically. When discovered his face was very pale, later it became more pink than normal. His breathing, at first 6 to the minute, gradually increased to normal rate and was stertorous. His pulse gradually became stronger and his corneal reflex returned. A pinkish, frothy mucus collected in his mouth, and necessitated constant cleaning out of the throat for some two hours. He was given a hypodermic injection of atropine sulphate (gr. 1/100) with the

[1] THE LANCET, 1916, ii., 950.

result that the exudation was greatly checked. The temperature was now about normal, the face slightly flushed, and the respiration continued laboured and stertorous. All his limbs were flaccid, urine and fæces were passed involuntarily, and the pupil reacted sluggishly to light. Later in the afternoon general convulsive seizures began, closely resembling those of tetanus, with a typical risus sardonicus. They lasted about five minutes, and recurred at intervals of 10 minutes. He was given two injections of morphine, 1/4 gr. in all. This somewhat diminished the violence and frequency of the convulsive seizures. Next day the patient could swallow a little and was given brandy-and-water at intervals. He was still passing urine in the bed. On this day the spasms were much less frequent and severe. Lumbar puncture was performed, 14 c.c. of normal fluid being withdrawn under slightly increased pressure. The Babinski reflex was positive on both sides. The knee-jerks were very sluggish; there was no ankle clonus. Towards evening the breathing became more and more stertorous. He was very restless during the night, moaning at intervals; the spasms also occurred with greater frequency. The urine was found to contain a considerable amount of pus, but no trace of hydrocyanic acid. On the succeeding days the spasms recurred with less frequency and of diminishing severity. During the spasms he moaned as if in pain. The temperature gradually rose; the heart was normal throughout. A short time before death some moist sounds were heard at the bases of the lungs. The pulse became much weaker and the patient died 110 hours after inhalation of gas. The temperature rose to 106° F. before death. The necropsy showed a slight congestion of the cerebral convolutions and pyelitis due to old gonorrhœal infection. Some of the blood was submitted to the Government analyst, who was unable to find the slightest trace of hydrocyanic acid or any of its compounds.

THE LIMIT OF SAFETY OF LEAD IN WATER-SUPPLIES.

IN an interesting note which we have received from Dr. John C. Thresh, medical officer of health of the Essex County Council, he points out that it is not generally known that certain natural waters contain traces of lead in solution. As far as his experience extends these waters are always derived from mountain limestone in neighbourhoods where veins of galena are met with. The amount of lead varies between 1 part in 12½ millions and 1 part in 25 millions, equivalent to 1/178th and 1/357th of a grain per gallon of water. Dr. Thresh quotes several authorities on the question of the limit of safety for the lead content of a potable water, who conclude in general that a water containing 1/100th part of a grain per gallon or even 1/300th part of a grain might be injurious to health, but he suggests grave reasons for doubting whether such a conclusion is correct. The amount of lead shown on a single sample may, likely enough, be far below the average amount found in the water, and in one of Dr. Thresh's cases the water often contained 1/5th grain of lead per gallon. These observations refer apparently to waters which had taken up lead in passing through service pipes, and such waters may at one time contain even less than 1/300th of a grain per gallon, yet at others may contain even as much as 1 grain per gallon. On the basis of a daily intake for drinking purposes of 3 pints of water, a person would consume 137 gallons per annum, and hence to ingest 1 grain of lead from a water containing 1/100th of a grain per gallon the consumer would have to drink at this rate for nine months, or for over two years if the water only contained 1/300th of a grain per gallon. Dr. Thresh observes that the kidneys of any individual adult or child which could not eliminate the metal at this rate would be in such a condition that he would be unlikely to live long enough to accumulate a poisonous dose of the metal, and he quotes Sir William Osler to the effect that "lead is rapidly eliminated by kidneys and skin," and that "children are relatively less liable and females more liable to suffer from lead poisoning than men." In Dr. Thresh's opinion, when a natural *hard* water contains lead in a less proportion than 1 in 5 millions it may be passed as being practically free from lead and perfectly wholesome so far as the lead contents are concerned. In the case of *soft* waters which take up lead from supply pipes he does not think it would be wise to pass a water containing 1 part per million, unless it was perfectly certain that the water was being so treated that this amount was never exceeded. There is to be reckoned with also the possibility of a natural hard water carrying from time to time particles of sinter containing lead in suspension. As is pointed out, in the neighbourhood of lead-mines, used or disused, it is not unusual for cattle to be poisoned by lead. Such lead does not appear to be in solution but in suspension, which is removed by careful filtration. In one instance in a spring water Dr. Thresh found 1 part of lead in 5 millions, but after filtration it only amounted to 1 part in 25 millions.

INTRAVENOUS INJECTIONS OF TARTAR EMETIC IN MALARIA.

THE recent observations of Sir Leonard Rogers in Calcutta showed that in certain malarial cases malignant tertian crescents disappeared from the blood after the use of intravenous injections of tartar emetic, and also that the same method of treatment was effective in cases of benign tertian infection. He suggested that quinine should be employed to check the malarial paroxysm, while tartar emetic should subsequently be used intravenously in order to destroy, if possible, the extra-corpuscular stages of the parasites—that is, the crescents of subtertian and the corresponding resisting forms of other types—thus preventing relapses and greatly reducing the infectiousness of the patient to malaria-bearing mosquitoes. The methods of Sir Leonard Rogers have been tried by other experts, but not always with the same success. G. C. Low and H. B. Newham, of the London School of Tropical Medicine, have placed on record a case in which tartar emetic, although given in larger and more numerous doses than those employed by Rogers, failed to have any effect upon either rings or crescents. Professor J. W. W. Stephens, of Liverpool, in coöperation with other specialists, has also made trial of this method of treatment, but came to the conclusion that intravenous injections of tartar emetic did not in his cases cause the disappearance from the peripheral blood of any stage of the malarial parasites, whether *P. vivax* or *P. falciparum;* nor did these injections control either the rigors or the fever of acute malaria. A more recent contribution to the discussion is supplied from South Africa by Captain A. J. Orenstein, S.A.M.C., medical officer in charge of the Wanderers' Hospital, Johannesburg, and

Lieutenant-Colonel W. Watkins Pitchford, S.A.M.C., Director of the South African Institute for Medical Research, whose observations are published in the *Medical Journal of South Africa*. From their paper it appears that the severe prevalence of malaria among the Union troops returning to Johannesburg from German East Africa offered opportunities for giving a trial to Rogers's method of treatment, and to the possibility of freeing malaria-carrying convalescents from the resistant gametocyte forms of the parasite. These experts treated all cases of crescent infection with tartar emetic injections, and in their paper they publish the outline case-histories of the first 25 patients. Combined with the tartar emetic given intravenously, quinine in doses of from 10 to 15 grains was administered by the mouth. They state that their results appear to confirm the suggestion of Rogers that tartar emetic when administered intravenously leads to a disappearance of the gametocytes of subtertian malaria; but the treatment has no marked effect upon the trophozoites of this parasite, nor upon those of benign tertian. Their observations do not permit them to express any opinion as to the influence of the drug upon the gametocyte stages of other than the subtertian parasite. The generally recognised resistance of crescents to quinine, they remark, was well illustrated in several of their cases. That these crescents are susceptible to the action of tartar emetic injections is suggested not only by the fact of their disappearance, but also by the detection of broken-up forms in certain instances. Owing to the demand for beds in the Wanderers' Hospital, where the malarial cases were treated, it was necessary to discharge the men as soon as their recovery seemed reasonably complete. This necessity, unfortunately, restricted the number of consecutive and negative blood examinations which could be obtained before discharge. In many instances the total number of examinations was considerably less than would have been made if more assistance had been available.

THE TRAINING AND SUPPLY OF MIDWIVES.

A LARGE and increasing proportion of births among the poorer classes—almost three-quarters of the total—are attended by midwives. Happily, the vast majority of births take place without any untoward incident, but childbirth, although a perfectly natural process, is, like other natural processes, liable to accidents, perversions, and sudden emergencies, most of which are easily remedied or averted if recognised and taken in time, and provided skilled control is available, but which may be destructive to mother and child alike if the necessary skilled assistance is unavailable, or when meddlesome or ignorant interference is substituted for it. How the midwife is to be fitted to render this skilled assistance was the theme of a memorandum presented by Dr. E. W. Hope, medical officer of health for Liverpool, at the recent annual meeting of the Association for Promoting the Training and Supply of Midwives, and now reprinted in pamphlet form.[1] Dr. Hope has long been well known for his effective presentation of the view that the midwife is an essential factor in every scheme affecting the welfare of maternity and infancy, and that her potentialities must be recognised and applied to the best purpose if such schemes are to command success. The need for a raised standard of midwifery skill is evident in the records of the gynæcological wards of any hospital, and the midwife's influence does not end with the confinement. Attending as she does upon the mother and the baby for a period of not less than 10 days, her influence may be of the utmost consequence in obtaining treatment for the sequelæ of venereal disease, and thus ensuring that a succession of miscarriages and stillbirths shall give place to the birth of living and healthy children. Dr. Hope touched in his address on the question of the class from which the midwife is recruited, speculating on what induces her to enter upon a calling involving much work for little reward. Some, he finds, have a vocation for midwifery; some, perhaps 15–20 per cent., have succeeded to a practice from the mother; others take it as the only means they know of earning a few pounds. A fairly large proportion of married women take up midwifery in order to meet increasing domestic expenses caused by additions to their own families. The economic result is summarised in a sentence: It is hardly possible under existing circumstances for a reasonable livelihood to be earned by midwives. Dr. Hope queries whether the need for the midwife is likely to diminish owing to the attendance in the future by medical practitioners of all maternity cases and the provision of hospital establishments to obviate the necessity for births taking place in the undesirable homes of the patients. He concludes that there is not the least possibility of either of these things happening. With progressive housing operations homes will not be so undesirable, and in any case hospitals are never likely to meet the needs. There never have been enough doctors to go round in many populous English centres, however overstocked the ranks of the profession have been in more favoured localities, and to the usual wastage must be added the loss of those who have fallen in the war and the sapping of the normal supply at its source. Recognising, then, that the midwife is essential, Dr. Hope sees the solution of the problem of supply in a free or subsidised vocational training of perhaps two years, as is already the case in France and Denmark, a terminal examination to give evidence of fitness to practise, followed by a guarantee of a livelihood by means of a payment over and above the fee received from each patient. The subsidised and trained midwife would be expected to undertake practice wherever she was sent, but by the method of subsidising a free choice would still be left to her clients, whilst there would be no inducement to her to shirk nor to undersell. The cost of such a scheme to the Exchequer is estimated by Dr. Hope as between £80,000 and £100,000 per year. He commended the consideration of some proposal of this kind to the Association as a piece of constructive policy, and it will be a matter of regret if serious thought is not directed to these very reasonable propositions.

THE National Health Insurance Commissioners have made regulations establishing arrangements for treatment by medical practitioners of all sailors and soldiers (including those who are uninsured) invalided from service with the Forces. These arrangements provide special facilities whereby such men can obtain the services of a doctor without delay immediately upon discharge; and they also include special provision for the treatment in sanatoria of discharged men suffering from tuberculosis. We have dealt elsewhere with the official notifications.

[1] Liverpool: C. Tinling and Co.

STUDIES IN ANATOMICAL NOMENCLATURE,

WITH A VIEW TO AN INTERNATIONAL NOMENCLATURE BASED UPON THE B.N.A.

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Introduction to the Studies.

"A NEW nomenclature ranks low in the registers of fame. As a work of mere patience and industry, it aspires to no lustre or *éclat*, it promises no immortality to its author, nor secures to his name any enviable marks of distinction. ..... Its influence extends to what must appear only a speck in the map of science, and yet even there, if it should facilitate the progress of study and remove only a part of the rubbish that obstructs the journey, the author will consider his object as attained."

So wrote Dr. John Barclay when he published "A New Anatomical Nomenclature" in 1803, and so, no doubt, would he be writing were he alive to-day, for we may be sure he would still be publishing, not in the fond hope of winning distinction or immortality for himself, but simply from the desire to help the student by removing even a part of the rubbish that obstructs the journey.

Both in the British and in the Austro-German nomenclature (which latter is commonly known as the B.N.A.) the names are too often based upon unessentials and unilluminating, inconsistent with the facts and incompatible with each other. The British nomenclature, however, has done long and faithful service, and now that it is fighting for its life against the Austro-German, he would, indeed, be a traitor to science in Britain who did not, if he could, prick the bubble of the Teutonic reputation for superiority. Recent events have revealed the Teutons in a light surprising to many who have never had the opportunity of close acquaintance with the Teutonic scientist. For years the Teutons have catered wholesale for the wants of post-graduates, and in this way have drawn to their Universities thousands of young men from all parts of the world. This pilgrimage of the nations has led the willing Teutons to believe that their country is the Mecca of science and civilisation. There is one civilisation and one science and the Teuton is its prophet. That is their creed, and so loudly and so incessantly have they been proclaiming it that none can have failed to learn it, and many have come actually to believe it.

The Teutonic anatomists of last century certainly deserve credit for having realised that about 85 per cent. of the terms then in use were unnecessary and for having made a serious and successful attempt to get rid of them. Chiefly by postal ballot they sifted out some 25,000 names, leaving as residue the B.N.A., which is not an international nomenclature based on scientific principles, but merely an inchoate list of 5000 Teutonic names for the various parts and structures of the human body. Unfortunately the B.N.A. has been adopted in the United States and in several of the British Dominions. Even in Britain certain anatomists have recently attempted to oust the British in favour of the Teutonic nomenclature, and, although this attempt has been bitterly opposed, the student may listen to lectures in the British, dissect in the Teutonic, and converse in both, with the natural result that he becomes cloudy in thought and incoherent in speech.

It would be a long but by no means a difficult task to prove that the B.N.A. is unscientific in conception, illiterate in language, and careless and inaccurate in execution. It is a blunt and clumsy tool which cannot itself turn out the best class of work and which spoils those who use it for any tool capable of doing better.

Destructive criticism, however, is of very limited value and a book on new lines, even if time could be found for its production, would be foredoomed to failure. The writer is inclined to believe that something might be accomplished by a series of short studies which might at least demonstrate what is too lightly regarded as impossible—namely, that the human body can be scientifically described in comparatively simple terms. The first principle of anatomical nomenclature is that "every name shall be descriptive and as short and simple as possible." Any nomenclature which, like the Teutonic, professes that its names are "merely memory signs, and need lay no claim to description or to speculative interpretation," is already condemned out of its own mouth. The French have not adopted, and never will adopt, the B.N.A. The time is ripe for throwing off the shackles of the inchoate nomenclature which makes anatomy so needlessly difficult and uninteresting and for producing a simple descriptive nomenclature capable of commanding the respect and winning the adhesion of all who do not confound precision with preciosity and accuracy with lumbering formality.

STUDY I.

The Direct Method.

"Science and simplicity" should be the watchword of all scientific writing, and in accordance with this the first principle of anatomical nomenclature should be that "every name shall be descriptive and as short and simple as possible." The Austro-German nomenclature (which, because it was promulgated in 1895 at the so-called International Conference of Anatomists at Basle, is known as the Basle Nomina Anatomica, or, for shortness, the B.N.A.) adopts among others the principles that "each term shall be as short and simple as possible," and that "the terms shall be merely memory signs and need lay no claim to description or to speculative interpretation." The B.N.A. does not state, indeed it does not apparently know, what it means by description, and it fails as a nomenclature simply because of its sublime refusal to admit that in anatomy every name should, if possible, have a meaning.

What is the Direct Method?—The actual meaning of an anatomical name may in itself be of little importance, but it is only by carefully considering the meaning of each name that a satisfactory nomenclature can be evolved, since simplicity and shortness depend almost entirely upon the directness with which this meaning is expressed. The incomparable value of such names as vomer, fibula, cornu, caput, and many others depends not so much upon their actual meaning as upon the directness with which that meaning is expressed. How clumsy the forms os vomerinum, os fibulare, processus ceratoideus, processus capitalis or cephaloideus appear by contrast! Yet the B.N.A. contains many equally grotesque forms, such as os cuneiforme for cuneus, os naviculare for navicula, cartilago arytænoidea for arytæna, cartilago thyreoidea for thyreus, processus alaris for ala, processus condyloideus for condylus. The B.N.A. is indeed most instructive since, although many of its names are ideally descriptive, simple, and short, its authors either had not the insight to discover the underlying principle or they lacked the courage or the patience to apply it. They evidently realised that the ideal name for a structure or part of the body would be one which in some way related it to another structure or part, but they were puzzled by the fact that in not a few cases this was impossible. They did not see that there must be an irreducible minimum of structures which, while providing names for other structures, themselves require to be named on some different principle. Take, for example, many of the bones. Any method which should attempt to find names for the individual bones of the wrist from their relation to the other structures or parts of the body would be very cumbrous. They might indeed from their position be called the os carpi proximale (or distale, as the case might be) primum, secundum, tertium, and quartum, but few would care to advocate such a terminology. On the other hand, if they are to be named after their physical characters, the simplest method would be to call each bone after some object which it may be supposed in whole or in part to resemble. The first bone of the wrist was originally supposed to resemble a scapha (*σκαφη*, vessel, bowl, boat), on which account it was called as in the British terminology the scaphoid or scapha-like bone (*σκαφο-είδης*, vessel-shaped). The Austro-Germans, taking scapha to mean a boat (cf. skiff) latinised the name into os naviculare. In either case the direct form scapha or navicula would be simpler and shorter. To determine which of these two should be chosen, it should be borne in mind that scapha is the original and the shorter term, that it means a bowl rather than a boat, and that the wrist-bone under consideration, and especially the bone of the foot which bears the same name, resembles the former rather than the latter. Still it must be recognised that while it is important that the bone should be called either the scapha or the navicula, it really does not seriously matter which of the two is chosen. Some would cut the Gordian knot by retaining both names on the ground that they mean much the same thing and are both well known, although one is originally Greek and the other Latin. This would violate one of the first principles of the B.N.A.—namely, that "each part shall have only one name." The decision of such a

question does not fall within the scope of this study, nor can any attempt be made here to deal with difficulties which may possibly arise from the use of Greek words through the medium of Latin.

In many cases, then, the meaning of a name is of importance, only in so far as it ensures shortness and simplicity. It is quite otherwise with names of relation, in which the meaning of the name may be instructive, e.g., os frontale, os temporale, os coccygis, os ischii. (It will be noticed that the B.N.A. employs either the genitive or the adjective, but the former is certainly the more vivid, e.g., os frontis, os temporis, and it also simplifies the names of related structures.)

II.—*The Direct Method illustrated in the Naming of the Bones and Cartilages.*

Just as the bones are the framework upon which the whole body is built up, so the names of the bones are the framework of all anatomical nomenclature. Other structures and parts of the body may be named from the bones, and in some cases the bones are named from the region in which they are found. Often, however, a bone must be named on some entirely different principle, such as from its function, as in the case of the atlas and axis vertebræ, or from its physical resemblance to some object, such as a boat, plough, sieve, wedge, cube, and so on. It is natural, then, in considering the principle enumerated above, to make a rapid survey of the names of the bones with which the cartilages may well be included.

1. *Names of Complete Bones and Cartilages.*—In naming a bone from its physical resemblance to some object the B.N.A. adopts two methods.

(A.) *The direct method.*—In the direct method the bone is called by the actual name of the object which it is supposed to resemble, and it must, of course, be named after one object only. If the resemblance is marked so much the better, but at least the name is short and simple, and the genitive case and adjective are easily formed, as is well seen in the following examples:—

B.N.A.	*Genitive.*	*Adjective.*	*Meaning.*
Vomer.	Vomeris.	Vomerinus.	Plough.
Radius.	Radii.	Radialis.	Spoke.
Fibula.	Fibulæ.	Fibularis.	Brooch-pin.
Patella.	Patellæ.	Patellaris.	Limpet.
Malleus.	Mallei.	Mallealis.	Hammer.
Incus.	Incudis.	Incudalis.	Anvil.
Stapes.	Stapedis.	Stapedius.	Stirrup.

(B.) *The indirect method.*—In the indirect method the name is formed by combining the word os, bone, with an adjective expressing the resemblance, e.g.:—

B.N.A.	*Meaning.*
Os naviculare.	Navicular or boat-shaped bone.
Os lunatum.	Lunate or moon-shaped bone.
Os pisiforme.	Pisiform or pea-shaped bone.
Os cuboideum.	Cuboid or cube-shaped bone.
Os ethmoidale.	Ethmoidal or sieve-shaped bone.

The indirect is the inferior method, since the name is longer, the genitive is clumsy, and the adjective is always some sort of a compromise, e.g.:—

B.N.A.	*Direct.*	*Meaning.*
1. Os naviculare. Ossis navicularis. Navicularis.	1. Naviculs. Naviculæ. Navicularis.	1. Boat.
2. Os lunatum. Ossis lunati. Lunatus.	2. Luna. Lunæ. Lunaris.	2. Moon.
3. Os pisiforme. Ossis pisiformis. Pisiformis.	3. Pisum. Pisi. Pisalis.	3. Pea.
4. Os cuboideum. Ossis cuboidei. Cuboideus.	4. Cubus. Cubi. Cubalis.	4. Cube.
5. Os ethmoidale. Ossis ethmoidalis. Ethmoidalis.	5. Ethmus. Ethmi. Ethmalis.	5. Sieve.
6. Os cuneiforme. Ossis cuneiformis. Cuneiformis.	6. Cuneus. Cunei. Cunealis.	6. Wedge.
7. Os sphenoidale. Ossis sphenoidalis. Sphenoidalis.	7. Sphen. Sphenis. Sphenalis.	7. Wedge.
8. Os sesamoideum. Ossis sesamoidei. Sesamoideus.	8. Sesame. Sesamæ. Sesamalis.	8. Sesame.
9. Cartilago thyreoidea. Cartilaginis thyreoideæ. Thyreoideus.	9. Thyreus. Thyrei. Thyrealis.	9. Shield.
10. Cartilago cricoidea. Cartilaginis cricoideæ. Cricoideus.	10. Cricus. Crici. Cricalis.	10. Signet ring.
11. Cartilago arytænoidea. Cartilaginis arytænoideæ. Arytænoideus.	11. Arytæna. Arytænæ. Arytænalis.	11. Jug.
12. Cartilago triticea. Cartilaginis triticeæ. Triticeus.	12. Triticum. Tritici. Triticeus.	12. Wheat-grain.

2. *General Terms Applied to Parts of Bones and Cartilages.*—In naming parts of bones and cartilages the B.N.A. frequently employs the direct method and with excellent result, e.g.:—

B.N.A.	*Meaning.*	*B.N.A.*	*Meaning.*
Spina.	Spine.	Rostrum.	Beak.
Dens.	Tooth.	Concha.	Shell.
Cornu.	Horn.	Ala.	Wing.
Malleolus.	Little hammer.	Hamulus.	Hooklet.
Condylus.	Knuckle.	Cochlea.	Shell.
Corona.	Crown.	Jugum.	Ridge.
Caput.	Head.	Ramus.	Branch.
Squama.	Scale.	Collum.	Neck.
Sella.	Saddle.	Trochlea.	Pulley.
Lingula.	Little tongue.	Acetabulum.	Cup.

In the case of the second cervical vertebra the superiority of the B.N.A. term dens, or tooth, over the British odontoid process is obvious. On the other hand, there are in the B.N.A. many failures, e.g.:—

B.N.A.	*Direct.*	*Meaning.*
Processus spinosus.	Spina.	Spine.
Processus mammillaris.	Mammilla.	Nipple.
Processus xiphoideus.	Xiphus.	Sword.
Processus pterygoideus.	Pteryx.	Wing.
Processus pyramidalis.	Pyramis.	Pyramid.
Processus condyloideus.	Condylus.	Knuckle.
Processus coronoideus.	Corona.	Crown.
Processus styloideus.	Stylus.	Style.
Processus alaris.	Ala.	Wing.
Processus coracoideus.	Corax.	Crow.
Pars petrosa.	Petra.	Rock.
Lamina cribrosa.	Cribrum.	Sieve.
Lamina papyracea.	Papyrus.	Papyrus.
Cavitas glenoidalis.	Glene.	Cup.

3. *Complete Names of Parts of Bones and Cartilages.*—The complete name of the part of a bone or cartilage consists of a general term combined with the name of the bone or cartilage itself. The B.N.A. does this at haphazard with either the genitive or the adjective, e.g.:—

B.N.A. with Genitive.	*B.N.A. with adjective.*
Manubrium sterni.	Planum sternale.
Spina ossis sphenoidalis.	Lingula sphenoidalis.

In all such combinations the genitive is to be preferred and direct forms should always be used. In many instances the B.N.A. is eminently satisfactory, e.g.:—

B.N.A.	
Spina scapulæ.	Condylus tibiæ.
Trochlea femoris.	Ala vomeris.

More often perhaps the B.N.A. fails, e.g.:—

B.N.A.	*Direct.*
Processus spinosus vertebræ.	Spina vertebræ.
Processus condyloideus mandibulæ.	Condylus mandibulæ.
Processus xiphoideus sterni.	Xiphus sterni.
Processus pterygoideus ossis sphenoidalis.	Pteryx sphenis.
Processus coronoideus ulnæ.	Corona ulnæ.
Processus styloideus radii.	Stylus radii.
Processus alaris ossis ethmoidalis.	Ala ethmi.
Lamina cribrosa ossis ethmoidalis.	Cribrum ethmi.
Lamina papyracea ossis ethmoidalis.	Papyrus ethmi.
Cavitas glenoidalis scapulæ.	Glene scapulæ.

The names may be even more complex, e.g., (*a*) for a portion or part of a bone; (*b*) when part of a bone is in relation with some other structure, e.g.:—

B.N.A.	*Direct.*
(*a*) Laminæ processus pterygoidei ossis sphenoidalis.	Laminæ pterygis sphenis.
(*b*) Crista ethmoidalis maxillæ.	Crista ethmalis maxillæ.
Facies cerebralis ossis sphenoidalis.	Facies cerebralis sphenis.

4. *Names of Bones and Cartilages Employed in Forming Names for other Structures.*—If the names of the bones were simple and short the names of many other structures could be shortened and simplified, e.g.:—

B.N.A.	*Direct.*
Articulatio ossis pisiformis.	Articulatio pisi.
Articulatio calcaneocuboidea.	Articulatio calcaneocubalis.
Ligamentum cuboideonaviculare.	Ligamentum cuboscaphale.
Ligamentum navicularicuneiforme.	Ligamentum scaphocuneale.
Musculus thyreoarytænoideus.	Musculus thyreoarytæmalis.
Musculus cricothyreoideus.	Musculus cricothyrealis.
Arteria thyreoidea.	Arteria thyrealis.
Arteria ethmoidalis.	Vena ethmalis.
Vena chorioidea.	Vena chorialis.
Emissarium condyloideum.	Emissarium condylare.
Nervus pterygoideus.	Nervus pterygalis.
Nervus ethmoidalis.	Nervus ethmalis.
Cisternæ subarachnoidales.	Cisternæ subarachnales.

III.—*The Direct Method as a General Principle in Anatomical Nomenclature.*

If the principle that "Every name shall be descriptive and as short and simple as possible" were adopted throughout anatomical nomenclature, much "rubbish" could rapidly be removed. A few examples must suffice.

B.N.A.	*Direct.*
Dura mater.	Dura.
Arachnoidea.	Arachne.
Pia mater.	Pia.
Corpus callosum.	Callosum.
Corpus mammillare.	Mammilla.
Corpus quadrigeminum.	Quadrigeminus.
Corpus striatum.	Striatum.
Corpus restiforme.	Restis.
Rostrum corporis callosi.	Rostrum callosi.
Nuclei corporis mammillaris.	Nuclei mammillæ.

These names, without exception, refer to the brain and its membranes, the nomenclature and description of which afford excellent examples of "polysyllabic profundity and pompous prolixity." In a standard British work on histology are to be found in a single line the three adjectives, dural, arachnoidal, and pia-matral. Why not simply dural, arachnal, and pial? The evil consequences of neglect of the direct method are well seen by a comparison of the principles which guided the authors of the B.N.A. with the results attained in that nomenclature. The secret of the failure of the B.N.A. is undoubtedly its sublime refusal to admit that every name should, if possible, have a meaning. No one who has not carefully studied the question can have the least idea how many terms in the B.N.A. contradict the principles on which it is based. Among such principles are the following:—

(1) Each part shall have only one name.

(2) Each term shall be in Latin and be philologically correct.

(3) Each term shall be as short and simple as possible.

(4) The terms shall be merely memory signs and need lay no claim to description or to speculative interpretation.

The authors of the B.N.A. seem to have been quite unaware how often its terms are unnecessarily and even absurdly long, how many are Greek or philologically incorrect or even actually duplicated. In truth, it matters little whether anatomical terms are originally Latin or Greek and whether they are philologically correct, particularly in Britain, in these days when the average student and even teacher of medicine knows so little of either language. The one thing of vital importance is that the names should be descriptive and as short and simple as possible. If the official names are too often long, or complex, or meaningless it is only to be expected that they will not be scrupulously employed. Everyone will find a substitute, sometimes good, more often the reverse. The official names must be such as no one need hesitate to use even in their official form. Much of the apparent precision of the B.N.A. is a specious preciosity indulgence in which soon destroys all sense of the value of words and the power to use them effectively. Once admit that names need not mean anything and it is only too easy to speak and write in a way which is intelligible only when the meaning of the words is ignored. It is illiterate to use -oid (*o-ειδης*) as a simple adjectival termination—e.g., taloid for talar, intercondyloid for intercondylar, atloid for atlantic, and so on, and to speak of the liver as the hepatic organ is pure pomposity. An eminent British surgeon writes that "The nasopharynx should be inspected by means of a post-nasal mirror or by digital exploration with the index finger." As if anyone could inspect with the finger, or could explore with the index otherwise than digitally! Again, "Brain abscesses of otitic origin occur most frequently in the temporo-sphenoidal and cerebellar lobes, more rarely in the frontal and occipital hemispheres." What are the cerebellar lobes, and where may the frontal and occipital hemispheres be found? Such disregard for precision is a poor testimonial to the real quality of science in Britain. The B.N.A., however, is not alone responsible for these and the numerous other examples which might easily be given. The British nomenclature is also to some extent guilty.

IV.—*The Direct Method is the Key to an International Nomenclature.*

An international anatomical nomenclature is urgently needed, but conflicting national claims are difficult to reconcile. Each national nomenclature, good in many ways, is in others sadly defective. The only hope of reconciliation lies in a short and simple descriptive nomenclature based on principles so well defined that national partiality must give way before scientific method and practical utility.

The authors of the B.N.A. had a magnificent opportunity, but they failed because of their short-sightedness. Instead of aiming at an international nomenclature, they deliberately limited themselves to forming a list of terms acceptable to German-speaking anatomists, in the hope that later on they might gain the coöperation of anatomists speaking other languages. Out of the 30,000 names to be found in the various standard text-books of the day they succeeded in the Herculean task of clearing away about 25,000. They tried to evolve principles by the way, but these were of the most general character—e.g., that "each part shall have only one name"; that "each term shall be in Latin and be philologically correct"; that "each term shall be as short and simple as possible"; that "adjectives in general shall be arranged as opposites—e.g., dexter and sinister, major and minor, anterior and posterior, superficialis and profundus." Two of their principles were even contradictory—namely, that "related terms shall as far as possible be similar—e.g., femur, arteria femoralis, vena femoralis, nervus femoralis"—and that "the terms shall be merely memory signs and need lay no claim to description or to speculative interpretation" (or, in other words, "the terms shall be merely labels and need have no meaning").

These principles are quite in accordance with the remarkable method which they employed. According to Professor Barker, "the editor took as a basis the names used in the latest large text-book of gross anatomy. These terms were written down in a vertical column and the synonyms from a number of other much-used text-books placed in parallel columns. The lists were manifolded and a copy sent to each commissioner with the request that he mark the term of his choice, or, if he found none suitable, to propose a new one for the structure concerned. Each commissioner was to return his list with comments to Professor Krause." Finally, a special editing committee was appointed, consisting of Professors His, Krause, and Waldeyer, to whom was delegated "the task of giving a uniform character to the terminology as a whole." This committee must be held responsible for the failure of the B.N.A. Although the ore had been dug out the metal had not been extracted. Each term having been balloted for independently it was now the duty of the special committee carefully to examine the list with a view to working out principles for the systematic naming of all structures belonging to each different type. In naming the bones, for example, the B.N.A. employs three methods, in naming the joints four, and so on, and these methods are employed at haphazard. There is no principle to determine how many methods are necessary or which is to be chosen in any particular instance. This is simply because each name is merely a "memory sign" or label quite independent of its fellows. Though the structures fall into groups the members of the various groups need not be correlated in the nomenclature. Each term is an isolated unit which need not even have a meaning.

Such methods can never produce a scientific international nomenclature. At best they may provide a list of terms for the use of anatomists of every nation in studying and teaching their science. Even that is almost impossible, because each term in the list has to contend against the national terms, and the B.N.A. has no principle which can decide in its favour. Indeed, in many instances national terms are based upon principles before which the B.N.A. itself must bow. Thus there arise from the brain and pass out of the cranium 12 nerves, of which four alone arise from the cerebrum. The 12 are called in Germany the cerebral, and in Britain the cranial, nerves. Unless we are prepared to admit that "the terms shall be merely memory signs and need lay no claim to description or to speculative interpretation" the German term must be given up. Moreover, even as a "memory sign" the accurately descriptive British term "cranial" is preferable to the inaccurately descriptive German term "cerebral." It is throughout a war of principles, and herein lies the weakness of the B.N.A. It has few principles, and of these the one which claims that "the terms shall be merely memory signs" is of itself fatal. Apart from this, however, the others are too general to decide conflicting national claims.

If then the B.N.A. is not, and never was intended to be, an international nomenclature, it would be folly to allow it in Britain to oust the national nomenclature, nor can we afford to leave the two to fight it out. Those anatomists who have thrust the B.N.A. into our midst may have been unwise, but those who object to it will be equally blameworthy if they merely wait and see. It is their duty either to cast the B.N.A. or the British nomenclature into an

international form, or to work out a new international nomenclature from the various national terms in existence throughout the world to-day. The best, probably the only, chance of success lies in remodelling the B.N.A. according to well-defined principles, most of which can readily be evolved from the methods of the B.N.A. itself. The first principle of international nomenclature is, however, in part at least, absolutely at variance with the B.N.A.—"Every name must be descriptive, and as short and simple as possible." For this the direct method is essential.

REPORT OF THE LOCAL GOVERNMENT BOARD FOR 1916-17.

THE forty-sixth annual report of the Local Government Board has recently been issued. With a view to economy it has been still further reduced in size by the exclusion of matter concerning the normal activities of the department, and by the omission of statistical and other tables usually contained in these reports. Part I. gives interesting details of special preventive work for the relief of distress due to war, for the maintenance of internment camps, and for the accommodation of war refugees. Part II. deals with the administration of the several Working-classes Acts, and of the Act of 1909 which relates to town-planning. Part III., with which we are more particularly concerned, relates, *inter alia*, to new work arising out of the war, under circumstances of special difficulty, consequent on serious depletion of the official staff.

Public Health.

Tuberculous disease.—Under the National Insurance Act 291 residential institutions and 370 dispensaries in England and Wales have been approved by the Board, in the former of which 11,883 beds have been set apart for the treatment of tuberculosis. This accommodation, however, has already been proved insufficient, and proposals are under consideration for the provision of additional beds for tuberculous children. In order to meet the needs of tuberculous soldiers and sailors who were about to be discharged from service on account of this infection, provision has been made during the year for their treatment in residential institutions. In addition to the buildings previously taken over by the military authorities for use as tuberculosis hospitals, a considerable number of beds have been devoted to that purpose in the course of 1916. Thus the adult pavilion at the Huddersfield Sanatorium has recently been completed and adapted for use as a temporary war hospital. At Liverpool the Nurses' Home and the Children's Pavilion at the Fazakerley Sanatorium have been placed at the disposal of the War Office. At Leeds the Killingbeck Hospital, with 60 beds, has been made available for the treatment of this disease, and additional accommodation has been provided by the town council at the Seacroft isolation hospital. The Doncaster town council have lent to the military authorities their Balby Hospital for use in the treatment of tuberculosis.

Venereal diseases.—Substantial progress has been made in the organisation of measures for the provision of free diagnosis and treatment of venereal diseases. The shortage of medical staff and of accommodation at most hospitals has presented serious obstacles. Nevertheless, about 150 hospitals in this country have already expressed willingness to engage in the present campaign. It is estimated that the arrangements already sanctioned will serve for a population of 18 millions out of a total of 25 millions for which accommodation has been approved. The main features of the schemes for the diagnosis and treatment of venereal diseases in each county and borough will be published in a later report.

Infectious diseases other than tuberculosis and venereal diseases.—The notification of the more important common infectious diseases is set forth in a table, from which it appears that, excluding measles and German measles, which only became notifiable in the beginning of 1916, there has been in most cases a decrease in the numbers notified during last year as compared with 1915. This is in some degree attributable to the reduction in the civil population. Especially noteworthy is the material fall in the fever attacks during 1916. Statistical details of infectious disease in England and Wales will appear in the report of the Board's medical officer to be issued as a supplement to the present report. Having regard, however, to war conditions the account of the work of the Board's medical inspectors, acting under the medical officer's direction, will be much curtailed.

Maternity and child welfare: Government grants.—Substantial progress was achieved last year in the development of schemes for safeguarding the health of expectant and nursing mothers, as well as that of their offspring. Provision for home visiting is known to be the most effective element in a scheme of this kind. By the end of last year the councils of nearly all the large towns, and a large proportion of the extra metropolitan county councils, had made some provision for home visiting. The number of health visitors appointed by the local authorities, which had been 600 in 1914, rose to 812 in 1915, and to 1445 by the end of February, 1917. In addition, health visiting has been undertaken on behalf of county councils by about 800 district nurses. At the end of last year the number of salaried health visitors supported by voluntary agencies is reported to have reached 136, but a large additional number is still required in order to provide satisfactorily for the service of the whole country. The maternity and child welfare centres have also increased rapidly—the number up to last Lady-day having totalled 842, of which more than half were voluntary undertakings. During the year 1916 the Local Government Board made grants in respect of maternity and child welfare schemes amounting to £68,000. The work, however, is hampered by the fact that the powers of English local authorities are more restricted than those of other parts of the United Kingdom.

Medical officers on military service.—Owing to the increasing demands of the war, and consequent also on the inhumanity of the enemy in sinking hospital ships, there has been a growing demand for medical men for the Army. The number of medical officers released by local authorities in order to take temporary commissions with the forces now exceeds 500.

URBAN VITAL STATISTICS.

(Week ended Sept. 1st, 1917.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 17,000,000 persons, the annual rate of mortality was 10·6, against rates of 10·4, 10·5, and 10·6 per 1000 in the three preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was also 10·6, or 0·1 per 1000 above that recorded in the previous week; among the remaining towns the death-rates ranged from 3·7 in Wallasey, 4·4 in Gloucester, and 4·8 in Ealing to 15·8 in Leeds, 16·2 in Gateshead, and 17·6 in Middlesbrough. The principal epidemic diseases caused 430 deaths, which corresponded to an annual rate of 1·3 per 1000, and comprised 312 from infantile diarrhœa, 41 from measles, 31 from whooping-cough, 27 from diphtheria, 11 from enteric fever, and 8 from scarlet fever. The deaths from diarrhœa, which had increased from 53 to 274 in the six preceding weeks, further rose to 312, and included 95 in London, 26 in Liverpool, 18 in Leeds, and 15 in West Ham and in Manchester. The 622 cases of scarlet fever and 1022 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were respectively 8 above and 41 below the numbers remaining at the end of the previous week. Of the 3456 deaths from all causes in the 96 towns, 123 resulted from violence. The causes of 31 deaths were uncertified, of which 7 were registered in Liverpool and 5 in Gateshead, but not one in London.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual death-rate was 11·2, against 11·7, and 10·3 per 1000 in the two preceding weeks. The 253 deaths in Glasgow corresponded to an annual rate of 11·8 per 1000, and included 33 from infantile diarrhœa, 4 from whooping-cough, and 1 each from measles, scarlet fever, and diphtheria. The 58 deaths in Edinburgh were equal to a rate of 9·1 per 1000, and included 1 from diphtheria.

Irish Towns.—The 109 deaths in Dublin corresponded to an annual rate of 14·2, or 5·3 per 1000 less than that recorded in the previous week, and included 26 from infantile diarrhœa and 2 from measles. The 94 deaths in Belfast were equal to a rate of 12·5 per 1000, and included 5 from infantile diarrhœa, 2 from measles, and one from whooping cough.

THE name of Mr. H. Morriston Davies was inadvertently omitted from the list of the staff of University College Hospital, London, given in our Students' Number (August 25th). Mr. Davies recently retired from the active staff of the hospital on account of an unfortunate accident to his hand, and was then appointed consulting surgeon.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue :—

Killed.

Capt. C. Weller, R.A.M.C., attached London Regiment, was a student at Guy's Hospital, London, and qualified in 1910. Before joining up he was in practice at Redhill, Surrey.

Drowned.

Col. T. Daly, C.M.G., R.A.M.C., qualified in Ireland in 1881, and shortly afterwards joined the Army Medical Service, being appointed surgeon-captain in August, 1885. He saw much service in India, and took part in the South African War, for which he received medals and clasps and was mentioned in despatches. He joined the Expeditionary Force in France soon after the outbreak of war, and had been an Assistant Director of Medical Services since the middle of 1915. He was on his way to Egypt when he was lost in the sinking of the transport *Arcadian*.

Died of Wounds.

Capt. J. E. S. Wilson, M.C., R.A.M.C., attached Oxford and Bucks Light Infantry, was a student at the London Hospital and qualified in 1911. Before joining up he was in practice at Iver, Bucks, where he was medical officer to the local cottage hospital and to the Alexandra House Home for Feeble-Minded Girls. He died in a hospital abroad. The award of the M.C. was recorded in THE LANCET of Sept. 30th, 1916, p. 621.

Capt. J. C. Harris, R.A.M.C., was a student at the Dental Hospital and at the Birmingham University, qualifying L.D.S. R.C.S. Eng. in 1906 and M.R.C.S., L.R.C.P. Lond. in 1910. Before joining up he was in practice at Wolverhampton.

Wounded.

Capt. E. G. Anderson, R.A.M.C.
Capt. H. M. Clarke, R.A.M.C.
Capt. H. J. De Brent, R.A.M.C., attached Cheshire Regiment.
Capt. D. Lees, R.A.M.C., attached Irish Guards.
Capt. W. H. Lister, M.C., R.A.M.C.
Capt. H. M. Anderson, R.A.M.C.
Lieut. C. J. E. Edmonds, R.A.M.C., attached Manchester Regiment.
Capt. R. I. Harris, M.C., R.A.M.C.
Capt. G. A. Hodgson, R.A.M.C.
Capt. H. G. Janion, M.C., R.A.M.C.
Capt. W. J. Knight, M.C., R.A.M.C.
Capt. I. Ogilvie, R.A.M.C.
Capt. W. Leslie, M.C., R.A.M.C.
Lieut.-Col. C. H. S. Frankau, R.A.M.C.
Lieut. R. T. Worthington, R.A.M.C.
Capt. E. S. Smalpage, Australian A.M.C.
Capt. T. MacK. Millar, M.C., R.A.M.C.
Capt. J. E. Bloomer, Canadian A.M.C.
Lieut.-Col. A. S. Donaldson, Canadian A.M.C.
Capt. J. H. Jones, Canadian A.M.C.
Capt. J. Moore, Canadian A.M.C.
Capt. K. Biggs, R.A.M.C., attached R.F.A.
Capt. H. H. Elliot, R.A.M.C., attached Rifle Brigade.
Capt. D. S. Robertson, R.A.M.C., attached Essex Regiment.
Capt. A. R. Hargreaves, R.A.M.C., attached Royal Scots.
Capt. S. A. W. Munro, R.A.M.C., attd. Seaforth Highlanders.

Previously reported Wounded, now reported Not Wounded.

Major J. P. Kenny, Australian A.M.C.

Previously reported Wounded and Missing, now reported Prisoner in German hands.

Capt. H. K. Ward, M.C., R.A.M.C., attached King's Royal Rifle Corps.

Previously reported Missing, now reported Prisoner in German hands.

Capt. E. D. F. Hayes, R.A.M.C., attached Northampton Regiment.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported :—

Second Lieut. E. R. Osler, R.F.A., died of wounds, only child of Sir W. Osler, Bart., Regius Professor of Medicine, Oxford University.

Capt. A. Forbes, Royal Warwickshire Regiment, killed in action, elder son of the late Dr. W. G. Forbes, of Stokesley, Yorkshire.

Second Lieut. E. C. G. Hull, Royal Field Artillery, killed in action, elder son of Dr. E. G. Hull, of Streatham, London.

Capt. A. V. Burlton, Royal Flying Corps, killed in a flying accident at Catterick, only son of Lt.-Col. A. H. Burlton, R.A.M.C. (retired).

[We learn that Dr. L. A. Francis, of Uxbridge, has received unofficial information that his son, Second Lieut. W. F. Francis, Hertfordshire Regt., is a prisoner of war at Karlsruhe, and has not been killed in action as officially reported by the War Office, and recorded in THE LANCET of August 18th, p. 259. We sincerely trust that the more recent information is correct.]

FOREIGN DECORATIONS.

French.

Légion d'Honneur.—Croix de Chevalier : Maj. (temp. Lt.-Col.) A. B. Fry, I.M.S.

Croix de Guerre.—Capt. A. L. Robertson, R.A.M.C., S.R.; Temp. Capt. J. W. Edington, R.A.M.C.; Temp. Lt. W. McKee, R.A.M.C.; Capt. W. L. Murphy, R.A.M.C.; Temp Lt. D. G. C. Tasker, R.A.M.C.; Capt. L. D. Bailey, R.A.M.C.; Temp. Lt. R. N. Kapadia, I.M.S.; Capt. A. W. Forrester, Med. Officer, Rhodesian Native Regt.; Capt. F. W. Hay, I.M.S.; Capt. J. B. Lapsley, I.M.S.; Temp. Maj. T. M. H. Leonard, W. Afr. Med. Serv., attd. Nigerian Contingent.

Italian.

Order of the Crown of Italy.—Cavalier : Maj. (temp. Lt.-Col.) W. H. Hamilton, D.S.O., I.M.S.

Silver Medal for Military Valour.—Capt. C. A. Godson, I.M.S.

Egyptian.

Order of the Nile.—Third Class : Maj. R. B. Black, D.S.O., late Egyptian Army and Sudan Government Service. *Fourth Class :* Capt. C. M. Drew, R.A.M.C., late Medical Corps, Egyptian Army; Capt. D. S. Buist, R.A.M.C., Medical Corps, Egyptian Army; Capt. H. M. Parsons-Smith, R.A.M.C., Medical Corps, Egyptian Army.

Belgian.

Order of Leopold.—Commander : Surg.-Gen. Sir A. W. May, K.C.B., K.H.P.

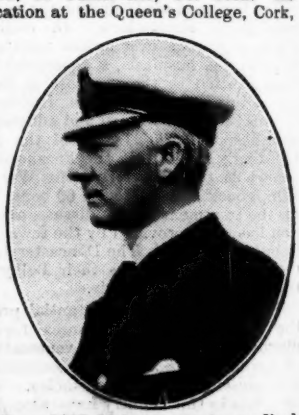
Order of the Crown.—Commander : Deputy-Surg.-Gen. J. P. McNabb, R.N. *Officer :* Fleet-Surg. K. H. Jones, R.N.

OBITUARY OF THE WAR.

EDWARD COPLEY WARD, M.D., M.S. R.U.I.,

FLEET-SURGEON, ROYAL NAVY.

Fleet-Surgeon E. C. Ward, who died on August 7th at the Royal Naval Hospital, Chatham, was eldest son of the late Thomas McNamara Ward, of Charleville, Co. Cork. He received his medical education at the Queen's College, Cork, and Edinburgh University, where he had a distinguished career, graduating at the Royal University of Ireland in 1883. A year later he joined the Royal Navy, in which he nearly completed 33 years' service.



His first commission was with H.M.S. *Northumberland* at a time when H.M. the King was serving as a lieutenant. His sea service was considerable, and included experiences of the Cape of Good Hope, the West Coast of Africa, China, Australasia, the Mediterranean, Home, and Channel Fleet Stations. From 1907–10 he was senior medical officer of H.M. Dockyard, Chatham, and subsequently in the Portsmouth and Chatham Divisions of the Home Fleets. At the outbreak of the war he was serving with H.M.S. *Cornwallis*, was transferred to the *Emperor of India*, and later appointed to the R.N. Barracks at Chatham, where he was serving as medical transport officer up to the time of his illness. He underwent a severe surgical operation, from which he appeared to be recovering, when uræmic symptoms set in, from which he died rather suddenly.

Sir James Porter writes of Fleet-Surgeon Ward as a loyal, devoted, and capable public servant. "His accuracy and thoroughness were very remarkable." And a friend adds: "He was a most faithful and cheery companion, and his popularity was as universal among his shipmates as it was during his student days."

ALFRED SQUIRE TAYLOR, M.B. EDIN.,
CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain A. S. Taylor, who was killed in action in Flanders on July 31st at the age of 28 years, was youngest son of Rev. D. A. Taylor, D.D., Commissioner of Education in Ireland, and grandson of the late Sir David Taylor, of Belfast. He was educated at Campbell College and Edinburgh University, where he was president of the Union, and obtained his medical degrees in July, 1914. On the declaration of war he immediately volunteered for the Army, serving first in France and then in Mesopotamia, whence he was invalided home. On recovering his health he was sent again to the Western front, attached to the Highland Light Infantry. While dressing the wounds of a brother officer both he and his patient were killed instantaneously by the bursting of a shell.

His chiefs write of Captain Taylor as a gallant officer and a good friend, cheery under all circumstances. His keen sense of duty was seen in the quality of his work. Captain Taylor was one of the most brilliant of Irish athletes, well known in the football and cricket fields. In 1910 he won his Rugby cap against England and he also played for Ireland against Scotland and Wales as three-quarter.

RICHARD WELLINGTON SHEGOG, M.B., B.CH. DUB.,
CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain R. W. Shegog, who died on active service in France on August 1st, was elder son of the Rev. R. Shegog, late rector of Skerries, co. Dublin. He was educated at Mountjoy School and Trinity College, Dublin, at both of which he took a number of exhibitions, becoming a scholar and moderator in classics at his college. He was an active member of the Dublin Biological Association, and was awarded a medal for research work in immunity, his paper on the subject being communicated to the Association. After taking his medical degree in June, 1915, he joined the Royal Army Medical Corps, and had just completed two years' service when his career was cut short. He was wounded at a dressing station on July 31st, and died from shock on the following day.

Captain Shegog was recently married to Florence Margaret, daughter of the late Dr. W. Sandham Symes, of Chesterfield, and leaves a widow and infant son.

EDWARD SPENCER CALTHROP, M.B., B.S. LOND.,
SURGEON, ROYAL NAVY.

Surgeon E. S. Calthrop, who died on July 30th of toxic neuritis, contracted in Gallipoli, was second son of the late Edward Calthrop, M.R.C.S. He studied medicine at Charing Cross Hospital Medical School, obtaining the diplomas of the Conjoint Board in 1909 and the medical degree of London University in the following year. The day before war was declared he joined the Navy, going through the whole of the Gallipoli campaign, and was afterwards attached to a Naval Division in Salonika and France. His chief medical officer writes of him: "I believe the world generally has lost a man who would have played a good part in it. There was no man who did his duty more fearlessly or conscientiously"; and another of his superiors adds: "His care for the wounded was marvellous; he always volunteered for any job requiring skill and pluck in carrying it out, like the brave fellow he was. The greater the danger the cheerier he was."

JOHN NELIGAN, M.B., B.CH. N.U.I.,
CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain J. Neligan, whose death on active service was announced in THE LANCET of June 30th, was educated at King's College, London, completing his medical studies at the National University of Ireland, where he graduated in June, 1915. After holding the post of assistant medical officer to the Leavesden Asylum, Herts, he obtained a commission in the Royal Army Medical Corps, and was sent to Mesopotamia with the relief force in April, 1916. He was present at the capture of Bagdad, being mentioned in Sir Stanley Maude's despatch. On his way home he volunteered for a second year's service and remained at Cairo, where his death occurred.

SAMUEL CHARLES ELLISON, M.D. EDIN.,
LIEUTENANT, ROYAL ARMY MEDICAL CORPS.

Lieutenant S. C. Ellison, who died in a military hospital in Egypt on July 17th, at the age of 42, was son of the late Rev. John W. Ellison, M.A., for many years minister of the Presbyterian Church at Sunderland. He took his medical studies at the University of Edinburgh and Queen's College, Belfast, where he was scholar, qualifying in 1902 and obtaining the M.D. Edin. two years later. After obtaining practical experience as locum-tenent for a while, he settled in Small Heath, Birmingham, where he built up a large practice over a period of 12 years. Shortly after the outbreak of war he intimated his readiness to join the Royal Army Medical Corps when required. He was ultimately called up last May and was sent out to Egypt, where he died shortly after landing. At a meeting of the Small Heath Ward of the Birmingham Practitioners' Union a resolution was carried conveying the sympathy of the union to Lieutenant Ellison's relatives, and placing on record his colleagues' high appreciation of his many good qualities, especially of his unfailing good nature and the high degree of conscientiousness shown by him in all dealings with his fellow-practitioners.

IT was stated at the last meeting of the Bristol Board of Guardians that the cost of the new infirmary which was recently erected at Southmead, and is now used as a military hospital, was £61,560.

TREATMENT OF THE INVALIDED SAILOR OR SOLDIER: NEW REGULATIONS OF NATIONAL HEALTH INSURANCE.

Memorandum 234 I.C., which has just been issued to doctors, deals with the regulations under Section 4 of the National Insurance (Part I. Amendment) Act, 1917, extending medical and sanatorium benefits to all invalided *uninsured* sailors and soldiers whose income from all sources does not exceed £160 a year. The Insurance Commissioners admit that the position of invalided men in general is exceptional, but not in the absence of data to prove it that an excessive burden of liability to afford treatment necessarily arises. They propose therefore what they describe as an "automatic solution" of the question at issue, which is payment on an attendance basis, accounts being calculated on a slight extension scale in force as regards "temporary residents." A special fund will be constituted into which 9*s.* per head per annum will be paid, and this fund, if insufficient for treatment on an attendance basis, will be supplemented to the necessary extent by an Exchequer grant.

The proposed scale for calculating remuneration in respect of the treatment of disabled soldiers runs as follows:—

	£	*s.*	*d.*
(1) Visit to the patient's residence	0	2	6
(2) Attendance on the patient at the practitioner's residence, surgery, or dispensary	0	2	0
(3) Special visit (i.e., visit paid by the patient's desire on the same day as a call received after 10 A.M. or on Sunday)	0	3	6
(4) Night visit (i.e., visit made between the hours of 8 P.M. and 8 A.M. in response to a call received between those hours)	0	5	0
(5) †Surgical operation requiring local or general anæsthetic	1	1	0
(6) Administration of general anæsthetic for the purposes of any operation included in medical benefit...	1	1	0
(7) †Setting of fracture	1	1	0
(8) †Reduction of dislocation	1	1	0
(9) Mileage, per mile beyond three miles (one way only) ...	0	1	0
(10) Attendance on patient attending at the practitioner's residence, surgery, or dispensary for the purpose only of obtaining certificate	0	1	0
(11) Special Report under Art. 8 of the National Health Insurance (Medical Benefit) Regulations, 1916 (No. 2) ...	0	1	0

† Subsequent visits or attendances to count as ordinary visits or attendances.

The Commissioners admit that the case of the medical profession for special consideration applies to all invalided men as a class, and all such men invalided hereafter will be treated under the new payment per attendance arrangement, each invalided man being provided on his discharge with a special form, I.S.1, to complete and present to the doctor of his choice, when he receives a special (blue) medical card. "Practical difficulties of identification" prevent the arrangement being made universally retrospective, but with regard to invalided men already included in his list the doctor will be given the option of retaining him as a capitation patient or having him placed upon the new basis. If he prefers the latter a special form, I.S.2, to be obtained on application to the Insurance Committee, should be filled in; or when a patient who is already receiving treatment under the ordinary arrangement discloses the fact that he has been invalided from the Forces an endorsement on p. 3 of the ordinary medical card "*Invalided in (month and year)*" will insure the issue of the special (blue) medical card.

Other clauses in the Memorandum deal with the reference to the Local Pensions Committees for provision of special treatment under the terms of the new Royal Warrant, and the admission of practitioners not on the panel under a special agreement to the same terms and conditions of service to invalided men.

TREATMENT OF DISABLED SOLDIERS IN SCOTLAND.

A scheme is developing in Scotland for the succour of the soldier who finds himself on discharge still suffering from the results of service. Three new hospitals in and near Edinburgh have been planned, the sites chosen, and the financial arrangements concluded. Under the Pensions Ministry, which has set up district committees for the formation of hospitals, Scotland has been divided for the purpose of caring for the discharged soldier into four districts—namely, Edinburgh and South-Eastern, Glasgow and South-Western, Dundee and Central, and Aberdeen and Northern. The dominating committee of all these districts is the Institution Committee for Scotland.

When these committees were formed the view was taken in the Edinburgh district that five diseases demanded the provision of special hospitals—viz., neurasthenia, epilepsy, tuberculosis, advanced rheumatism, and paraplegia. Arrangements have now been made to provide three institutions for the succour of three types of patient. The neurasthenic hospital will be at Craig End, Liberton. This estate has been purchased by the city of Edinburgh corporation for £13,500, and they will lease it to the Edinburgh and South-Eastern District Committee. Nearly 60 patients will be admitted there as soon as the conversion is complete. It will be the only hospital of its kind in Scotland, and it is thought that in future years the University of Edinburgh may find it a very suitable establishment for neurasthenic treatment should they follow out their idea, at present put forward, of founding a chair of neurasthenics. The hospital for epileptics, the committee's second project, will be at Muriston, near Calder, 16 miles from Edinburgh. This epileptic colony may also be retained as a permanent institution. For orthopædic cases the Edinburgh Committee has secured a building in Edinburgh, which, with comparatively small cost, can be transformed into a temporary hospital. The aim was to place the new hospital near a centre where discharged disabled soldiers are trained for civilian employment, and it has been located accordingly in the neighbourhood of an institution now controlled by the educational authorities of the city for the purposes of technical instruction. Arrangements have been made for the treatment of discharged men suffering from excessive rheumatism at Red Cross auxiliary hospitals at Moffat and Strathpeffer, while consumptive and paraplegic patients will come under the special care of existing Edinburgh institutions. The financial burden of these enterprises is being borne partly by the Treasury, but in greater measure by the Red Cross Society.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

To be temporary Surgeons: C. J. A. McKillop and A. Selby-Green.

The following appointments have been notified:—Fleet-Surgeons: W. G. Westcott to *Edgar* and T. H. Vickers to *Hecla*. Staff-Surgeons: P. L. Crosbie to *Apollo*. Surgeons: W. C. Carson to *Victory* and J. L. Priston to Plymouth Hospital. Temporary Surgeons: D. A. MacKnight to *Ajax*, J. Fairbrother to Chatham Hospital, H. N. D. Richards to Plymouth Hospital, M. B. R. Swann to *Bacchante*, J. A. Hadfield to *Spanker*, W. M. Fairlee to Gibraltar Hospital, and J. Hollings to *Pembroke*, additional, for Chatham Hospital.

ROYAL NAVAL VOLUNTEER RESERVE.

The following appointment has been notified:—Surgeon: D. A. Macpherson to *Pembroke*.

ARMY MEDICAL SERVICE.

Surg.-Gen. Sir Tom Percy Woodhouse, K.C.M.G., C.B., is retained on the Active List under the provisions of Arts. 120 and 522, Royal Warrant for Pay and Promotion, and to be supernumerary.

Lieut.-Col. William W. Clemesha, I.M.S., to be temporary Colonel whilst employed as Assistant Director of Medical Services.

Col. F. W. C. Jones, C.B., is placed on the Retired List.

ROYAL ARMY MEDICAL CORPS.

Temp. Capt. W. H. F. F. Godwin relinquishes his commission.

Temp. Lieut. Henry R. Marsh relinquishes his commission.

Temp. Lieut. W. T. Warwick relinquishes his commission on account of ill-health.

SPECIAL RESERVE OF OFFICERS.

J. M. Savage to be Lieutenant.

TERRITORIAL FORCE.

Capt. (temp. Major) W. J. Hoyten relinquishes his temporary rank.

Capt. W. Marley-Cass relinquishes his commission on account of ill-health contracted on active service, and is granted the honorary rank of Captain.

To be Captains: Lieut. K. Atkin and Lieut. R. L. Collett.

Major H. Rutherford is restored to the establishment.

Capt. (temp. Major) H. B. Whitehouse relinquishes his temporary rank on alteration in posting, and is restored to the establishment.

Lieut. E. R. Marle to be Captain.

Capt. C. P. C. Sargent, from Territorial Force Reserves, to be Captain.

Capt. R. E. Humphrey is now seconded for duty with a General Hospital.

OVERSEA CONTINGENTS.

Canadian Army Medical Corps.

Lieut.-Col. R. P. Wright, D.S.O., Canadian A.M. Corps, to be Assistant Director of Medical Services, and to be Temporary Colonel whilst so employed.

Temp. Lieut. J. McW. Taylor to be Temporary Captain.

Temp. Capt. H. B Jeffs, M.C., to be Temporary Major.

V. E. Barrow to be Temporary Captain.

INDIAN MEDICAL SERVICE.

Lieut.-Col. W. Molesworth, C.I.E., M.B., V.H.S., to be Colonel.

Correspondence.

"Audi alteram partem."

THE LUMLEIAN LECTURES AND MEDICAL RESEARCH:

THE NEW SCHOOL.

To the Editor of THE LANCET.

SIR,—Controversy, above all with an old friend, is distasteful to me; there is something more to be said, but this shall be my last word.

It seems I was wrong in my definition of the "old" and "new" schools; it is not that the old is the clinical, and the new school that which, armed with the new and powerful methods of polygraph, X rays, electro-cardiogram, and so forth, has recently laid us under lasting obligations. Sir James Mackenzie retorts that "it is the hospital and laboratory workers" (the physiologists and pathologists) that "blind" as they are, have "dominated the profession" and given themselves insufferable airs. These are the "old" school. The new school, as with some candour he gives us to understand, is Sir James Mackenzie himself. As such, he declares, for instance, that "the medical profession" took up "recruiting, utterly unconscious of the fact that they did not possess the necessary knowledge." "Had the Royal College of Physicians itself taken up the duty" (i.e., every Member and Fellow except, of course, Sir James Mackenzie himself) "the same disastrous results would have followed because the necessary knowledge does not exist" (though the new school is not without some good notion of it). Alas! this accusation is but too true. We all, unless always for one of us, are far indeed from any certain and comprehensive understanding of that last and crowning miracle of creation, the human body. We have been, it is true, modestly thankful that we had penetrated a little way, and learned something, in two thousand years; but we are chastened by the verdict of the new school that our meddling with recruiting has been "disastrous." Not that the medical officers engaged, consisting of persons of various skill and experience, occupied on an unwonted task of enormous difficulty, and driven under terrific pressure, have made mistakes, this interpretation would be too generous to them; they would have been better away, their interference has been simply "disastrous." Their fault was sheer "ignorance of the amount of work a man in impaired health is capable of undertaking." Why, let us take a simpler case: In a girder of a bridge a flaw is found out accidentally—a flaw subject to stresses, frosts, and rust. The engineer is ordered to state definitely "the amount of work that impaired girder" (still *in situ*) "is capable of undertaking." As the girder is "failing" all the time he can but say that if Baldwin locomotives weighing 400 tons, with trucks of like capacity, are sent over the bridge at speeds of 60 miles an hour, it will collapse pretty soon; but that if light loads and low speeds be enforced, well, it may last ever so long. But the engineer then will appear as stupid and incompetent as the "old school" physician.

We were told that we blundered because we "cannot grasp the (new) movement" and "the significance of principles"; we cannot search rightly (as the new school does) for "the mechanism by which a symptom is produced," nor calculate the ultimate effect of the primary fault. Now, to meet the new school, I set out after my antique manner one or two only of the more important of these very "principles," in order to interpret this very "mechanism." Above all things, surely the heart is a pump and the circulation a hydraulic system. I quoted therefore one or two of the elementary hydraulic principles fundamentally implied, such as the cross sections of chambers and tubes and the behaviour of viscous fluids in linear or turbulent motion, with the respective losses of kinetic energy and so forth; plain laws of dynamics taught in all our schools. That they were correctly set out, and of no fine-spun or academic character, but in this matter of immediate and fundamental importance, I have since been assured by two or three distinguished physicists and physiologists. What is the comment of the new school on my answer to its own demand? Sir James Mackenzie says, "I frankly confess I don't understand him, and refrain from criticising"! The new school "frankly" is indifferent to the elementary laws of the functions of the pump and vascular system of whose "mechanism" it contemptuously asserts that its opponents are stupidly ignorant.

Again, Sir James Mackenzie has "searched the writings" of home and foreign authors, and "failed completely to get from any of them a clear description of what is meant by heart failure." No wonder; by no literary ingenuity can so loose and colloquial a phrase be made to stand upright or to support any precise argument. He pays me the compliment of saying that he has thus searched even my poor essays, and in vain. I am writing now, away from all books, my own or other; but if Sir James Mackenzie will look again into my *Diseases of Arteries* (Vol. II.) he will find that in my opinion to say a man died of heart failure is about as precise as the old saw that "he died of shortness of breath." No engineer would use "girder failure" as a technical term.

While scoffing at us for inattention to the origins of maladies, Sir James Mackenzie himself still hovers only over the final phases of a cardiac fault, one, it may be, of long standing, when a local has begun to extend itself into a more general disturbance. In his last letter he repeats that the first sign to be looked for is a "sensation." "Every genuine sensation," he says (what is a non-genuine sensation?) "has a physical cause in its production" (e.g., palpitation, exhaustion, &c.). Is "physical" exclusive of psychical? If not, we are left with the information that every sensation is caused; no very bright illumination. But it is in part this very psychical element which makes "effort-tests" so fallible; until, indeed, "sensations" begin to stare us in the face without their help. Sir James Mackenzie adds that "long before physical signs are evident the patient is conscious that something is amiss." This is the sort of proposition that the new school lays down—a vague proposition as often wrong as right. One longs for a quarter of an hour of the Socratic method with the new school. As to the paragraph on palpitation, if its content is valuable to the new school, the old school to a man will cheerfully do without it. I am not writing flippantly. Sir James Mackenzie is a very able man and has no doubt profounder meanings in his mind. I criticise, and can criticise, only what is written.

For farther illumination Sir James Mackenzie leaves the heart for gastric ulcer, of which, it seems, we are as ignorant as we are of heart diseases. Again he twits me personally with "ignorance of the cause and nature of heartburn"—a term surely even as loose as "heart failure" itself. Old women and others use it in various senses, but generally to signify, not regurgitation of the cleaner acid of the gastric juice, often in excess in gastric ulcer, but rather of the acrid products of the butyric fermentation; not a very abstruse process. However, in gastric ulcer "heartburn" is not a characteristic nor a very common feature—not, that is, in the ordinary use of the word. The proper pain of gastric ulcer arises when the peritoneal covering of the viscus is affected, as Dr. Hugh Anderson has explained.

Furthermore, Sir James Mackenzie writes: "The elementary knowledge for understanding pain is not yet known to the profession. We even do not know what tissues are capable of producing pain." This assertion reminds me of that in the previous letter which declared that no careful attempts had ever been made to study the behaviour of the heart in pregnancy. I then pointed out that, on the contrary, a great deal of particularly careful work had been devoted to this very subject; and now I note that this subject is silently dropped—with the "innocent murmurs." But I gladly testify that in this field, before the "new school" began, Sir James Mackenzie had done some early, original, and promising work, work which, I believe, he has laid aside for other disquisitions; but that merit cannot justify his lofty indifference to the no less valuable work of others in the sensory field, such as that of Dogiel, Henry Head, H. K. Anderson, Mott, and many another fellow neurologist. Dr. Anderson indeed has precisely demonstrated the very "tissue" which is asked for—namely, that in which visceral or other pains have their origin and seat.[1] I fear Sir James Mackenzie may again "frankly confess his ignorance" of these researches, but it is such isolation which allows an author to write without a blush: "No physician in the past had any conception of how to bring to light the information

[1] I am sorry that being away from home I cannot give the reference, but I have quoted his researches in my "Diseases of the Arteries."

behind a patient's sensations, nor knew how to set about acquiring that information"! "No physician in the past"; that is, until the new school arose!

I have animadverted more than once on the looseness of the terms and phrases of the new school, a looseness which betrays a like habit of dealing with thought, evidence, and doctrine. In a grave peroration Sir James Mackenzie, after advising the younger teachers not to lean on authority but to use their own faculties of observation and reason—a very salutary lesson but one which Sir James Mackenzie must have borrowed from the "old school"—appeals to them farther as follows: "Before you teach your students a simple fact, verify it from your personal experience, or search in the writings of your authorities for their reasons in making a statement." A "fact" is rather demonstrated than taught; alone it teaches nothing; nor is a fact a "statement"; nor again in the fact alone, uncoördinated with other facts, are there any reasons. A fact is no more a rational "statement" than a brick is a house. It is this lack of precision in terms in the new school which gives rise to much misunderstanding. And I am sorry to note a less excusable error. Sir James Mackenzie chides me for refusing for life insurance two brothers, otherwise eligible, on account of occasional extrasystoles in both. Now against this reading I had explicitly guarded myself by this clause—"or rather for stating the facts that led to their refusal." I well remember—for the coincidence was a curious one—telling these men that I had advised acceptance. It may surprise Sir James Mackenzie to hear that thirty or forty years ago the nature and significance of extrasystoles, thanks to observations of Burdon Sanderson, B. W. Richardson, Balfour, and many other physicians of the time, were as well, or as little, understood by the old school as they are now by the new.

Finally, Sir James Mackenzie knows, I hope, that no one has a greater respect for his work, and personal regard for himself than I have. We, all of us, owe much to him. If to my regret I shall have seemed to say anything inconsistent with this regard it is out of my regard for other men and other things also.

I am, Sir, yours faithfully,

CLIFFORD ALLBUTT.

Ullswater Hotel, Patterdale, Westmorland, August 26th, 1917.

PS.—In your issue of Sept. 1st is an interesting letter by Dr. E. W. Adams on the question of the adequacy of language to thought. That new thoughts may need new language or new readaptations of it, is true; but our first duty is to see that we use in a precise manner such language and terms as we possess.

To the Editor of THE LANCET.

SIR,—Two years' experience of cardiac work at a base overseas has shown that the question a medical officer has most often to answer in a "heart" case is a practical one: "Is the man 'fit' or 'unfit' for active service?" The "effort test" by Army physical drill, as recommended by the workers at the Military Hospital at Hampstead, was utilised to aid in answering this important question. During the whole of this experience the question of the clinical significance of a systolic murmur at the apex of the heart was constantly under consideration. The difficulty of estimating the myocardial efficiency by the response to effort, under circumstances where men may, even unconsciously, exaggerate their complaints, increases the complexity of the problem.

Sir Clifford Allbutt, in his letter to THE LANCET of Aug. 4th, which purports to represent the "old" school, begs the question by discussing "endocardial murmurs." The assessment of the importance of a systolic murmur is only possible when we know the cause to which it is due. To describe a bruit as an endocardial murmur in no way explains the pathology of its origin. The teaching of Mackenzie that we should endeavour to ascertain the real cause of any murmur heard, is always illustrated by his conception of the cardiac complications of rheumatic fever. Here the student in the "new" school learns the cause to be an infective process, often of slow progression, as demonstrated by the study of the infected individual throughout the rest of his life. It becomes difficult to disentangle "old" and "new" school ideas, but together they represent the tide of scientific progress. A study, with the continuity of observation that Sir James Mackenzie desires, of the "soil," as represented by the infected patient, must bear fruit equally with the researches that are conducted upon the "seed." The more so as to-day the clinical side of the study of many chronic infective processes is just as difficult and obscure as is their bacteriological aspect.

I am, Sir, yours faithfully,

JOHN E. MACILWAINE.

College-gardens, Belfast, August 17th, 1917.

THE GENESIS OF PHOBIAS IN CHILDHOOD.

To the Editor of THE LANCET.

SIR,—In your issue of August 18th Captain W. H. R. Rivers has recorded very fully an interesting case of claustrophobia. By careful direction of the thoughts of the sufferer, the remembrance of a certain terrifying incident in his childhood was regained. As a little child he had been shut up in a closed space, unable to escape the attentions of a growling dog. A complete cure followed when the tardy recollection of this incident had provided the explanation of the origin of the phobia. I suppose it is possible that in the sensitive mind of a child a single severe shock of this kind may produce effects which persist long after the recollection of the incident has faded from memory. I have had a patient, 50 years of age, who from fear of falling had never been able to go down stairs without holding on to the banisters. In his case, however, family tradition assigned the infirmity to a fall in early childhood, and since he had long accepted this explanation, though without recollection of it himself, I was unable to exercise "psycho-analysis" or effect a cure by a demonstration of the causative incident.

Whether such forgotten experiences are or are not a common cause of neuroses I do not pretend to say, but I think that everyone who is a student of childhood as well as of Freudism, in determining the cause of a phobia, would lay the greater stress, not upon any one shocking or terrifying experience, but upon the unwise attitude of parents and nurses in focussing the child's attention upon the fear, in sapping his confidence by showing their own apprehensions and communicating them to the suggestible child. The child of himself is not afraid to fall. It is the parents who make him afraid by treating the fall as a disaster. The child of himself is not afraid of being left alone. It is the parents who undermine his confidence by keeping him always under observation from a nameless dread of what may happen to him.

Captain Rivers's analysis of his case of claustrophobia ignores this all-important point. The malign influence was doubtless here a too great solicitude for an ailing child. An atmosphere of unrest and apprehension in the nursery exerts a depressing influence upon the mental equilibrium, the physical constitution, and the whole vitality of the child, and this influence is exerted not on a single occasion only, but throughout all the years of childhood. The restoring of the incident to memory and the subsequent freedom from symptoms indicate no more than that the extreme suggestibility which was his undoing during an ill-managed childhood is still to be found in the patient. If this sufferer from claustrophobia had had full recollection of the incident, or if the family had persistently repeated the story to him, would his own study of the teaching of Freud, which we are told had been close, have sufficed to effect a cure without the stimulating influence of Captain Rivers's personality? I think not.—I am, Sir, yours faithfully,

London, W., August 28th, 1917. H. CHARLES CAMERON.

THE RELATION OF TRENCH FEVER TO OTHER CONDITIONS.

To the Editor of THE LANCET.

SIR,—The following preliminary statement on the relations existing between trench fever, "P.U.O.," myalgia, "rheumatism," "influenza," "D.A.H." (or "soldier's heart"), and other obscure conditions accounting for an enormous percentage of the morbidity in the British Armies, appears to us to be of sufficient interest to be brought at once to the notice of the profession. The observations on which our conclusions are based were carried out on a large number of cases grouped as indicated above. We submit:—

1. That it is of the utmost importance to search carefully for the sources of toxin which may have precipitated breakdown in this group of cases.

2. That trench fever is a source of toxin in these conditions which cannot safely be ignored.

3. That many of the cases diagnosed as "pyrexia of uncertain origin" (P.U.O.), myalgia, "rheumatism," "influenza," should really be recognised as cases of trench fever.

4. That the trench fever infection is far more persistent than has been generally supposed, and that, as a consequence, its sequelæ are more widespread and important than has been recognised.

5. That hyperalgesic areas of skin and muscle are commonly met with in cases having a history of trench fever, "P.U.O.," myalgia, "rheumatism," "influenza," and also malaria, and that the same areas exist in many cases of D.A.H., or "soldier's heart," who may not be able to give a definite history of trench fever at the time of observation, but who, nevertheless, on exposure to undue effort, not infrequently develop a slight remitting temperature and other symptoms indicative of trench fever.

Disordered action of the heart (D.A.H.) in the soldier is now by some observers recognised as a clinical entity; but the condition may, nevertheless, conceivably result in the large majority of instances from one of many forms of intoxication or infection. The importance of leaving no effort unexpended to identify the specific toxin in each instance has not, perhaps, been fully admitted. The impairment of physical capacity has been carefully estimated, the classification of patients by their response to graduated exercise has been instituted as a reliable guide to the medical officer; but what remains to be done is to show that, granted intoxication or infection as a cause, a sound treatment must be based on the recognition and subsequent elimination of the toxin which caused the damage.

Our observations on the above enumerated conditions seem to us to support the view that intoxication or infection underlies D.A.H., and are therefore submitted for publication in the hope that the future investigation of the condition may be along the lines of a broader inquiry into the causes of intoxication rather than in further estimation of its effects.

The recent work of one of our number, Captain Dimond, in his recognition of the organism associated with trench fever illustrates what we mean, and if the remaining sources of intoxication or infection, whether in the blood, lungs, kidneys, or alimentary tract, could be similarly isolated by special workers we would be safe in assuming that a prognosis could, in most cases, be arrived at and prophylactic measures and treatment materially advanced.

We hope at an early date to publish a more complete statement upon our findings.

We are, Sir, yours faithfully,

W. BYAM, Major, R.A.M.C., Officer in Charge, Medical Division;
LYN DIMOND, Captain, R.A.M.C.;
V. E. SORAPURE, Captain, R.A.M.C.;
R. M. WILSON, Lieutenant, R.A.M.C.

Hampstead Military Hospital, Sept. 3rd, 1917.

*** A communication on the subject of trench fever from Captain Lyn Dimond appears in another part of our present issue.—ED. L.

PSYCHIATRY IN ENGLAND.

To the Editor of THE LANCET.

SIR,—Everyone with any experience of the treatment of mental and nervous breakdown must have read your leading article on "The Effect of the War upon Psychiatry in England" with the deepest interest. Shell shock cases and other mental disturbances caused by the war must have individual rather than general treatment, and as these cases are in the large majority purely functional it is manifestly clear that they require encouragement, happy environment, and people to be with them to distract their minds in various ways, gain their confidence, and assure them that they will soon be quite themselves again. The excellent book you mention, by Professor G. Elliot Smith and Mr. T. H. Pear, does not, to my mind, instil into our minds the necessity for well-chosen companions or nurses to help in their treatment, and too much stress is laid upon the physician's help. It is absolutely wicked to send many of these cases to asylums, although I have known of some few cases where such institutions were necessary and where they could not safely be supervised anywhere else, especially cases with a definite impulsive suicidal tendency.

With some 44 years of experience in lunacy the matter is one that greatly appeals to me. For the first 14 years of my medical life I dealt considerably with borderland cases, and many of these were saved from the necessity of certification. For the next 20 years I was superintendent of a fairly large private asylum, while during the last 10 years I have treated large numbers of borderland cases, and have seen very many mental cases in consultation. That the present lunacy laws are a great handicap to early treatment is a matter too well known to need discussion, though I admit that the Board of Control are taking a much less decidedly old-fashioned way of dealing with many cases and thus making it easier for experienced psychologists to deal with early mental cases without the fear of legal prosecution against those who receive these cases. One great fact which has never been satisfactorily cleared up is the standing reproach that with our palatial institutions for the insane, and with our great increase in pathological research, the recovery-rate of insanity is no higher to-day in these institutions than it was in the decade of 1865 to 1875.

I have been in correspondence with many mental physicians and with the Lunacy Board of Scotland, in which country far more clinical work is carried out than is the case in England, and yet the recovery rate is still *in statu quo*, and I have not yet been able to come to any definite conclusion as to the cause of this deplorable fact. It may be due to many causes: (1) the legal restrictions, which make the proper early treatment so difficult; (2) the want of individual study of the character, temperament, and causes which have led to the mental breakdown; and (3), perhaps the most important of all causes, the want of proper departmentisation of cases in asylums. This last cause has been brought home to me in many cases. Patients have been sent to institutions with the danger mark of suicidal tendency, and with this stigma they have been placed at once on the side of the asylum with the worst cases, because there, and there only, can constant supervision be easily and economically carried out. I have known mild cases of this sort which have been rendered much worse by being herded together with severe mental patients to their definite detriment. In the asylum I presided over I made a point of this departmentisation with very good results, while some of my patients who lived with my family hardly realised that they were in an asylum, and I could give the history of the recovery of many of such cases. Then, again, I fear we do not employ sufficient lady and gentleman companions who, if well trained, have such a beneficial effect upon many patients.

It is certainly the fact that many general practitioners are now getting into touch with mental cases caused by shell shock and nervous disturbance and gaining a considerable experience, but we still have many busy medical men who, in their own words, "cannot be bothered with mental cases and have no spare time to give to looking after them," and are only too glad to get them off their books.

I am, Sir, yours faithfully,

Bournemouth, Sept. 3rd, 1917. L. A. WEATHERLY, M.D.

INFANT MORTALITY AT VILLIERS-LE-DUC.

To the Editor of THE LANCET.

SIR,—In your annotation in THE LANCET of Sept. 1st relating to the report on infant mortality issued by the Commonwealth Committee on Death and Invalidity, you say that the report refers to the scheme enforced by the Municipality of Villiers-le-Duc, which it claims has simply abolished the death-rate of infants. The same claim was made in a recent Milroy lecture. I have not seen the Commonwealth report, but it is difficult to believe that its authors were aware of the extreme smallness of the data upon which these conclusions are based. The experience of Villiers-le-Duc has been widely boomed by social reformers, but in none of the accounts which I have seen have the actual figures been quoted—merely the death *rates*. The following are the facts:—

	Total births.	Deaths.	Infant mortality rate.
1892–1903	54	0	0
1906–1915	43	4	93

Taking the two periods together we have a rate of 41 deaths per 1000 births, which is about equal to the average of Connaught and much of the west of Ireland, and many healthy English rural districts.

Of course, no one with even an elementary knowledge of statistics would draw inferences from such wholly insufficient material, and to work out infant mortality rates per 1000 births on an average of less than 6 births per annum is the acme of absurdity. Yet this has been done in several of the published accounts of the Villiers-le-Duc scheme in order to show the effects of regulations.

I am, Sir, yours faithfully,

WILLIAM A. BREND.

Barmouth, North Wales, Sept. 2nd, 1917.

CAUTION IN GRANTING MEDICAL CERTIFICATES.

To the Editor of THE LANCET.

SIR,—Inasmuch as one of the daily duties of consultants just now is the granting of medical certificates to men who anticipate being called up on military service, it has occurred to me that in order to prevent the possibility of personation by unscrupulous people it is wise to get the examinee to write his signature in one's presence on the certificate given him. Otherwise the unfortunate consultant might find himself figuring at a later period in a criminal trial!

I am, Sir, yours faithfully,

Wimpole-street, W., August 29th, 1917. DAN MCKENZIE.

Obituary.

ARTHUR EDWARD PATTERSON, M.D. ABERD.

Dr. A. E. Patterson, who died on August 26th after a short illness, was senior assistant medical officer to the City of London Mental Hospital, Dartford. Son of the late Major D. A. Patterson, he received the whole of his education in Aberdeen, graduating M.B., C.M. at the University in 1885. After a short period of general practice he became assistant medical officer to the Derby Borough Asylum, and was later appointed to the City of London Mental Hospital. A conscientious and painstaking officer, his cheery manner and true kindness of heart made him popular amongst staff and patients alike. He was an active member of the Medico-Psychological Association, and published several articles, of which the most important was "An Analysis of 1000 Admissions into the City of London Asylum," in the *Journal of Mental Science*.

Medical News.

MEDICAL OFFICERSHIP OF BATH.—The post of medical officer of health for the city of Bath, rendered vacant by the death of Dr. W. H. Symons, will be temporarily filled for the duration of the war and six months afterwards by Mr. O. A. G. Collins, the medical officer of the Bath Statutory Hospital. It was felt by the sanitary authority of the city that, with so many potential candidates serving in the war, it would have been unfair to have advertised a permanent appointment, a view with which Mr. Collins has stated himself to be in accord.

MEASLES AND RESEARCH.—At the last meeting of the Sanitary Committee of the Manchester Corporation the following resolution was passed:—

> That in view of the frequently recurring outbreaks of measles on an extensive scale throughout the country and the mortality among young children occasioned thereby, this council urges upon the Government the desirability of setting aside a sum of money for research work into the causation of this disease and the best means of securing its prevention.

A copy of the resolution has been forwarded to the President of the Local Government Board.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).

When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

APPLECROSS PARISH COUNCIL.—Medical Officer and Public Vaccinator for the Torridon District. Salary £250 per annum, with house, &c.

BELFAST MUNICIPAL SANATORIUM, Whiteabbey.—Lady Superintendent (Temporary). Salary at rate of £120 per annum, with rations, &c.

BIRKENHEAD BOROUGH HOSPITAL.—Junior House Surgeon. Salary £175 per annum, with board, &c.

BIRKENHEAD UNION INFIRMARY.—Junior Female Resident Assistant Medical Officer. Salary at rate of £300 per annum, with board, &c.

BOLTON INFIRMARY.—Female Locum Tenens Assistant House Surgeon.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon. Salary at rate of £120 per annum, with board, &c.

BURY INFIRMARY.—Junior House Surgeon. Salary £150 per annum, with board, &c.

CARLISLE, CUMBERLAND INFIRMARY.—Female House Surgeon for six months. Salary at rate of £250 per annum, with board, &c. Also Female House Physician for six months. Salary at rate of £200 per annum, with board, &c.

CUMBERLAND, COUNTY OF.—Female Assistant Medical Officer. Salary £350 per annum.

DARTFORD, KENT, CITY OF LONDON MENTAL HOSPITAL.—Temporary Assistant Medical Officer. Salary £7 7s. per week, with board, &c.

DERBY, DERBYSHIRE ROYAL INFIRMARY.—House Surgeon. Salary £200 per annum, with board, &c.

HAMPSTEAD GENERAL AND NORTH-WEST LONDON HOSPITAL, Haverstock Hill, N.W.3.—House Physician for six months. Salary at rate of £200 per annum, with usual allowances.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—House Physician for six months. Salary 30 guineas.

HULL, VICTORIA HOSPITAL FOR SICK CHILDREN.—House Surgeon.

MANCHESTER, ANCOATS HOSPITAL.—Unqualified Resident. Salary £50 per annum, with board, &c.

MANCHESTER, ST. MARY'S HOSPITAL FOR WOMEN AND CHILDREN.—House Surgeon for Maternity Hospital. Salary £200 per annum, with board, &c.

MANCHESTER COUNTY ASYLUM, Prestwich.—Locum Tenens. Salary £7 7s. per week, with board, &c.

MIDDLESEX EDUCATION COMMITTEE, MEDICAL INSPECTION OF SCHOOL CHILDREN.—Temporary Assistant School Medical Officers. Salary at rate of £350 per annum.

NORTHUMBERLAND COUNTY COUNCIL.—Temporary Assistant County Medical Officer of Health and Assistant School Medical Officer. Salary at rate of £350 per annum.

NOTTINGHAM AND MIDLAND EYE INFIRMARY.—Ophthalmic House Surgeon.

PORTSMOUTH, ROYAL PORTSMOUTH HOSPITAL.—House Surgeon for six months. Salary £250 per annum, with board, &c.

ROTHERHAM HOSPITAL.—Junior House Surgeon. Salary £150, with board, &c.

SALFORD ROYAL HOSPITAL.—Junior House Surgeon for six months. Salary at rate of £150 per annum, with board, &c.

SHEFFIELD ROYAL INFIRMARY.—Two House Surgeons. Salary £120 per annum, with board, &c.

STAFFORDSHIRE, WOLVERHAMPTON, AND DUDLEY JOINT COMMITTEE FOR TUBERCULOSIS.—Resident Medical Officer for Moxley Sanatorium, near Wednesbury, Staffs, also to assist the Dispensary Medical Officers. Salary £350 per annum, with board, &c.

STOCKPORT INFIRMARY.—Senior House Surgeon. Salary £250 per annum, with board, &c.

WEST LONDON HOSPITAL, Hammersmith, W.—House Surgeon. Salary £4 4s. weekly, with board, &c.

WIGAN, ROYAL ALBERT EDWARD INFIRMARY.—Junior House Surgeon. Salary £200 per annum, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Littleborough (Lancaster) and Wotton-under-Edge (Gloucester).

Births, Marriages, and Deaths.

BIRTHS.

DAUNT.—On August 19th, in Edinburgh, the wife of Captain Francis Eldon Daunt, M.B., B.S. Lond., R.A.M.C., of a daughter.

ORAM.—On August 31st, at "Ridgemount," Anerley Park, S.E., the wife of Capt. Alger Roy Oram, M.B., B.Ch., B.A.O. N.U.I., R.A.M.C., of a daughter.

ROXBURGH.—On August 30th, at Belgrave crescent, Edinburgh, the wife of Temp. Surgeon Archibald Cathcart Roxburgh, M.B., B.C. Camb., R.N., of a son.

WADMORE.—On August 28th, at Clifton, Bristol, the wife of Captain Wadmore, R.A.M.C., of a son.

MARRIAGES.

HEARN—COOLING.—On Sept. 3rd, at the Hampstead Parish Church, Captain Reginald John Hearn, L.M.S.S.A. Lond., R.A.M.C., to Winifred Maud, younger daughter of Mr. and Mrs. Cooling, of Hampstead.

HIGGINS—INGRAM.—On August 29th, at the Parish Church, Congleton, Cheshire, by the Rev. Thomas Twistington Higgins, M.A., father of the bridegroom, assisted by the Rev. Charles Edward Sullivan, M.A., vicar of Hulme Walfield, Thomas Twistington Higgins, F.R.C.S., Captain, R.A.M.C., to Jessie, youngest daughter of Thomas Ingram, B.A., of Melrose, Scotland.

WRIGHT—LOWENFELD.—On August 25th, at the Chapel Royal, Savoy, Henry Wardel Snarey Wright, M.R.C.S. Eng., L.R.C.P. Lond., Captain, R.A.M.C., to Helena Rosa Lowenfeld, M.B., B.S. Lond., of Great Cumberland-place, London.

DEATHS.

ATKINSON.—On Sept. 1st, at Saff on Walden, John Parkinson Atkinson, M.D. Glasg., L.R.C.P. Lond., L.R.C.S. Ed., J.P., aged 79.

FIELDING.—On August 31st, at Bethel-street, Norwich, James Fielding, M.D. Vict. Univ. Canada, L.R.C.P. Edin., M.R.C.S. Eng., of The Crescent, Norwich.

GRIFFITH-WILLIAMS.—On Sept. 1st, at Mattishall, William Henry Griffith-Williams, L.R.C.P., L.R.C.S. Edin.

HORA.—On August 31st, at his residence, Hazel Brae, Filsham Park, St. Leonards-on-Sea, Mr. James Hora, Vice-President of the London Hospital and treasurer of Westminster Hospital, late of Victoria-street, Westminster, S.W., aged 91.

LAVER.—On August 31st, at 43, Head-street, Colchester, Alderman Henry Laver, J.P., M.R.C.S., F.S.A., in his 88th year. Funeral Tuesday, Sept. 4th, St. Mary at the Walls Church, Colchester.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

HEALTH AND HOSPITALS IN HONG-KONG.

A REPORT on the Blue-book of Hong-Kong for the year 1916 has just been presented through the Colonial Office to the Houses of Parliament. It states, *inter alia*, that the civil population of the colony, according to the Census taken in 1911, was 456,739, of whom 104,287 resided in the New Territories and in New Kowloon; at the Census taken in 1906 it was 301,967, exclusive of the New Territories and of New Kowloon. The estimated total population at the middle of the year under review was 528,010, but this includes the New Territories; and, as the birth and death figures given below do not include those from this area (with the exception of New Kowloon), the population for the purposes of calculating these rates is estimated at 431,510, of whom 13,390 were non-Chinese.

The corrected birth-rate for the year was 8·1 per 1000 among the Chinese community, and 20·05 per 1000 among the non-Chinese community, as compared with 8·4 and 13·2 during 1915. The death-rate for the year was 24·6 per 1000 among the Chinese community and 15·03 among the non Chinese community, as compared with 19·0 and 9·4 during 1915. The number of deaths from malaria (378) showed an increase on the previous year (368). The deaths of Chinese from this cause in the city of Victoria numbered 182 out of a population of 270,300, or a rate of 0·6 per 1000 per annum. The deaths from plague numbered 39, as compared with 144 in 1915. Small-pox deaths numbered 542, all Chinese, with the exception of three British and one each American, Portuguese, and Indian. There were 2112 deaths from respiratory diseases among the Chinese, as compared with 2303 in 1915. Pulmonary tuberculosis and phthisis claimed 963 Chinese victims, while other forms of tuberculosis represent an additional 554 deaths, making a total of 1517, or 14·4 per cent. of the grand total of deaths among that community. Beri-beri was responsible for 517 deaths, as compared with 398 during 1915 and 399 in 1914. During the past few years circulars have been distributed to all large employers of coolie labour calling their attention to the fact that beri-beri is produced by the consumption of white rice as the staple article of diet without a sufficiency of other foods, and advising that beans should be supplied with the rice when fresh meat or fresh fish cannot be afforded.

The Civil Hospital at Hong-Kong contains 150 beds in 19 wards. In it 3068 in-patients and 12,620 out-patients were treated during 1916, as against 3085 and 14,199 respectively in 1915. 360 cases of malarial fever were admitted, as against 384 in 1915 and 324 in 1914; but the total cases of malaria for all Government hospitals and the Tung Wa Hospital showed an increase of 684 cases as compared with the year 1915. At Kennedy Town Infectious Diseases Hospital, which contains 26 beds, 30 cases were treated in 1916, all being small-pox. The lunatic asylum is under the direction of the superintendent of the civil hospital. European and Chinese patients are separated, the European portion containing 8 beds in separate wards, and the Chinese portion 16 beds. 237 patients of all races were treated during 1916, and there were 6 deaths. The Tung Wa Hospital, opened in 1872, is mainly supported by the voluntary subscriptions of Chinese, but receives an annual grant of 8000 dollars from the Government. Only Chinese are treated in this institution. Chinese as well as European methods of treatment are employed in accordance with the wishes expressed by the patients or their friends; about half the number are now treated by Western methods. It is under the supervision of a visiting physician, who is a member of the medical department, whilst two Chinese house surgeons, trained in Western medicine, are members of the hospital staff. There are 323 beds in the buildings, and 5480 patients were accommodated during 1916. The Tung Wa also maintain a branch hospital for small-pox cases (Chinese only) at Kennedy Town; it contains 58 beds, and during 1916 171 cases were treated. The Alice Memorial and Affiliated Hospitals are managed and controlled by the missionaries resident in Hong-Kong, agents of the London Missionary Society, and consist of the Alice Memorial Hospital, opened in 1887, the Nethersole Hospital, opened in 1893, the Alice Memorial Maternity Hospital, opened in 1904, and the Ho Miu Ling Hospital, opened in 1906. The number of in-patients in 1916 was 1731; the number of labours in the Maternity Hospital was 560.

To avoid the complete seclusion from friends and relatives which removal of Chinese plague patients to the Kennedy Town Infectious Diseases Hospital entailed, four district plague hospitals are now maintained by the Chinese in various parts of the colony. These are under the management of the same committee as are the Chinese public dispensaries. These dispensaries, eight in number, are maintained by voluntary subscriptions in order to provide the Chinese with the services of doctors, whose certificates will be accepted by the registrar of deaths, and with the services of interpreters who can assist the inmates of houses where cases of infectious diseases occur. Coolies are engaged and ambulances and dead vans provided in order to remove cases of infectious disease to the Infectious Diseases Hospital and dead bodies to the mortuary. The dispensaries also receive sick infants and send them to one or other of the convents and arrange for the burial of dead infants. Free advice and medicine are given, and patients are attended at their houses. The new Kwong Wa Hospital for Chinese in the Kowloon Peninsula contains 70 beds, and 2490 patients were accommodated during 1916. One of the most important institutions in the colony not supported by the Government is the Matilda Hospital, founded under the will of the late Mr. Granville Sharp and reserved for British, American, and European patients. It stands on a commanding site of nearly three acres at Mount Kellet in the Hill District, and consists of a main building containing 6 wards with 26 beds, quarters for 4 nurses, a house for the medical officer in charge, and an operation block. A maternity ward connected by a covered way with the main building was completed during 1916.

The mean shade temperature for the year at the Royal Observatory, Kowloon (108 feet above mean sea level), was 71·8°, 0·4° lower than the mean for the past 10 years. The total rainfall for the year was 79·355 inches, as compared with an average of 82·56 inches during the 10 preceding years.

One of the most notable events of the year in Hong-Kong was the first Congregation of the University, which was held on Dec. 14th, when honorary degrees were conferred on, amongst others, Sir Robert Ho Tung, a merchant of Hong-Kong, the founder of a chair of clinical surgery in the University; Dr. Wu Lien Teh, who, after a brilliant career at Cambridge and in medical schools in England and on the continent, has done much useful work in China, including the stamping out of the plague epidemic in North Manchuria in 1910–11; and several graduates in the Faculty of Medicine. At the end of the year the number of students taking the course in medicine at the University was 52. The University is composed of three faculties—Medical, Arts, and Engineering. The medical offers ample facilities for the practice of medicine. The anatomical laboratories were the gift of a Cantonese gentleman, Mr. Ng Li-hing. There is a large staff of instructors in medicine, and all the principal medical practitioners in Hong-Kong give lectures at the University.

INTRAMUSCULAR GALYL.

Messrs. The Anglo-French Drug Company, Limited, of Gamage Building, Holborn, London, E.C. 1, point out in regard to our analytical notice of this preparation in our issue last week that the capacity of the ampoule was stated to be 15 cubic centimetres, whereas the volume of fluid is 2 cubic centimetres, containing 15 centigrammes of galyl.

X. Y. Z.—All writers on medical jurisprudence agree that the giving of a second certificate of death is inadvisable. There is no statute expressly forbidding a medical practitioner to do so, but apparently there are provisions annulling the value of any certificate other than the one first given. These provisions had their origin in a praiseworthy attempt to prevent the over-insurance of children. A section in the Friendly Societies Act, 1875, prohibits a registrar of deaths giving a certificate for an insured child unless the cause of death has been entered in the register on the certificate of a coroner or of a registered medical practitioner. The issue of two medical certificates might place the registrar in a difficult position.

Medical Diary for the ensuing Week.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.

TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.

FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

EDITORIAL NOTICES.

IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

Letters, whether intended for insertion or for private information, must be authenticated by the names and addresses of their writers—not necessarily for publication.

We cannot prescribe or recommend practitioners.

Offices: 423, STRAND, LONDON W.C. 2.

MANAGER'S NOTICES.

VOLUMES AND CASES.

VOLUMES for the first half of the year 1917 are now ready. Bound in cloth, gilt lettered, price 21*s.*, carriage extra.

Cases for binding the half-year's numbers (inland edition) are also ready. Cloth, gilt lettered, price 2*s.* 6*d.*, by post 2*s.* 10*d.*

To be obtained on application to the Manager, accompanied by remittance.

TO COLONIAL AND FOREIGN SUBSCRIBERS.

Subscribers abroad are particularly requested to note the rates of subscriptions given on page 4.

The Manager will be pleased to forward copies direct from the Offices to places abroad at the rates shown, whatever be the weight of any of the copies so supplied.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, Sept. 5th, 1917.

Date.	Rain-fall.	Solar Radio in Vacuo.	Maxi-mum Temp. Shade.	Min. Temp.	Wet Bulb.	Dry Bulb.	Remarks.
Aug. 30	...	105	66	55	55	58	Cloudy
,, 31	0·04	107	69	57	56	58	Cloudy
Sept. 1	0·01	77	61	57	58	59	Raining
,, 2	...	116	69	55	54	58	Cloudy
,, 3	0·01	109	72	51	55	58	Cloudy
,, 4	...	112	74	53	56	59	Fine
,, 5	...	105	74	57	58	62	Fine

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

BOOKS, ETC., RECEIVED.

BLAKISTON, P., SON, AND CO., Philadelphia.
Manual of Organic Materia Medica and Pharmacognosy. By L. E. Sayre, B.S., Ph.M. Fourth edition, revised. $4.50 net.

LIBRAIRIE J. B. BAILLIÈRE ET FILS, Paris.
Le Péritoine en Chirurgie de Guerre. Par le Dr. M. Stassen et le Dr. J. Voncken.

LIPPINCOTT (J. B.) Co., London, Philadelphia, and Montreal.
Text-book of Ophthalmology. By Hofrat E. Fuchs (Vienna) Authorised translation of twelfth German edition by A. Duane, M.D. (New York). Fifth edition. 32*s.* net.

MACMILLAN AND CO., London.
Class-book of Organic Chemistry. By J. B. Cohen, Ph.D., B.Sc., F.R.S. 4*s.* 6*d.*

SHERRATT AND HUGHES, Manchester.
Scientific Treatise on Smoke Abatement. By H. Hamilton, A.R. San. I., A.M.I. Mech.E. 5*s.* net.

WRIGHT, JOHN, AND SONS, London and Bristol.
British Journal of Surgery. Vol. IV. Edited by Sir Berkeley G. A. Moynihan, C.B., and Others. 30*s.* net.
Glimpses of My Life in Aran: Some Experiences of a District Nurse in these Remote Islands off the West Coast of Ireland. By B. N. Hedderman. Part I. Price 2*s.* 6*d.* net.

The following journals, magazines, &c., have been received:—M. A. B., British Journal of Dental Science, Archives Médicales Belges, Albany Medical Annals, M.D., Man, American Journal of Surgery, Edinburgh Medical Journal, Bristol Medico-Chirurgical Journal, British Dental Journal.

Communications, Letters, &c., have been received from—

A.—Dr. G. H. H. Almond, Bath; Capt. W. Appleyard, R.A.M.C.; Messrs. Arnold and Sons, Lond.; Messrs. Allen and Hanburys, Lond.; Mrs. M. C. Arthur, Lond.; Anglo-French Drug Co., Lond.; African Film Productions, Lond.; Mr. E. A. Armstrong, Ashbourne.

B.—Lieut. A. Brown, R.A.M.C.; Messrs. F. P. Baker and Co., Lond.; Mr. K. S. Bhat, Lond.; Bethel Hospital, Norwich, Clerk to the; Capt. A. Barr, A.V.C.; B. R.; Lieut. C. R. Brown; Capt. F. G. Bennett, R.A.M.C.; Capt. R. L. Barwick, R.A.M.C.; Belfast Corporation, Town Clerk of; Lieut. D. Brown, R.A.M.C.; Messrs. John Bale, Sons, and Danielsson, Lond; British Medical Association (Malta Branch), Valetta, Hon. Sec. of; Messrs. Butterworth and Co. Lond.; Lieut. N. Bradley, R.A.M.C.; Capt. St. J. D. Buxton, R.A.M.C.; Prof. D. T. Barry, Cork; Mr. S. C. Biswas, Lond.; Dr. W. A. Brend.

C.—Dr. H. Crouse, El Paso, U.S.A.; City of Coventry Education Dept., Clerk to the; County Asylum, Prestwich, Clerk to the; Cumberland Infirmary, Carlisle, Sec. of; Dr. P. S. Clarke, Lond.; Mrs. Calthorp, Lond.; Capt. J. Campbell, R.A.M.C.(S.R.); Dr. J. C. Connell, Kingston, Ontario.

D.—Dr. R. Donaldson, Reading; Capt. S.R. Douglas, I.M.S. (retd.); Dr. C. Duran, San José; Messrs. W. Dawson and Sons, Lond.; Mr. J. Dunlop, Lond.; Dr. S. Delépine, Lond.; Department of Scientific and Industrial Research, Lond., Sec. of; Capt. L. Dimond, R.A.M.C.

E.—Dr. H. Emerson, New York; Mr. G. F. Eyles, Rugby; Lieut.; Col. T. R. Elliott, R.A.M.C.; Dr. H. A. Ellis, Middlesbrough; Mrs. H. A. Edmunds, Brockweir; Capt. C. M. Elliott, R.A.M.C.; Capt. H. H. Elliott, R.A.M.C.; Eastbourne Eye Infirmary, Sec. of.

F.—Lieut. A. Fleming, R.A.M.C.; Mr. G. R. Footner, Lond.; Messrs. J. S. Fry and Sons, Bristol; Staff-Surg. R. R. Fasson, R.N.; Staff-Surg. P. Fildes, R.N.V.R.; Dr. W. Fingland, Liverpool; Dr. B. G. Fearnsides, Lond.; Major A. W. Falconer, R.A.M.C.(T.).

G.—Capt. H. G. Gibson, R.A.M.C.; Dr. J. F. Gemmell, Whittingham; Mr. H. Gratton, Lond.; Mr. T. Green, New Brighton; Genatosan, Lond.; G. M. L.; 1, Gorringe road, Eastbourne; Major H. D. Gillies, R.A.M.C.(T.); *Guy's Hospital Gazette*, Lond., Editor of; Greenock, &c., Hospital Board, Physician-Supt. of.

H.—Prof. R. T. Hewlett, Lond.; Mr. G. Hunter, Girvan; Messrs. A. Heywood and Son, Manchester; Messrs. Howards and Sons, Ilford; Major W. E. Home, R.A.M.C.; *The Hospital*, Lond., Editor of; Holborn Advertising Service, Lond.; Messrs. Harrison and Sons, Lond.

J.—Sir Robert Jones, Liverpool; Jessop Hospital for Women, Sheffield, Sec. of.

K.—Mr. R. Knox, Freshford; Dr. A. Kinsey-Morgan, Bournemouth; Dr. L. J. Kidd, Lond.

L.—Capt. C. W. R. Littlejohn, R.A.M.C.; Messrs. Lee and Nightingale, Liverpool; Messrs. H. K. Lewis and Co., Lond.; Mr. P. W. Latham, Fossoway; Messrs. J. Lyons and Co., Lond.; Mr. C. E. Lisle, Birmingham; Local Government Board, Lond., Sec. of; Miss Ethel de Longeuil, Cramond.

M.—Mr. H. Macleod, Whittington; Messrs. May and Baker, Lond.; Messrs. C. Mitchell and Co., Lond.; Lieut.-Col. A. Macphail C.A.M.C.; Maltine Manufacturing Co., Lond.; Messrs. Mable, Todd, and Co., Lond.; Dr. C. J. Macalister, Liverpool; Dr. J. B. MacIlwaine; Belfast; Dr. Dan McKenzie, Lond.; Capt. A. Macdonald, R.A.M.C.; Dr. H. A. Macewen, Lond.; Medical Research Committee, Lond., Sec. of; Mr. A. Mathers, Bath; Mr. M. Mead, Lond.

N.—National Association for the Prevention of Infant Mortality, Lond., Sec. of; National Health Insurance Commissioners, Lond.; Northumberland County Council, Newcastle-on-Tyne, County Medical Officer of; National Health Insurance Commission, (England), Solicitor's Dept.; Capt. A. T. Nankivell, R.A.M.C.; The National Party, Lond., Sec. of; Mr. W. Naughtin, Lond.

P.—Mr. C. A. Phillips, Lond.; Mr. V. G. Plarr, Lond., Messrs. Parke, Davis, and Co., Lond.; Mr. H. M. Page, Lond.; Dr. E. P. Prest, New Cumnock; Principal, Streatham.

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